U.S. Department of Energy

233U Safe Storage Program

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Program Execution Plan

For the

^{233}U Safe Storage Program

INEEL/EXT-99-00475

PROGRAM EXECUTION PLAN
for the
^{233}U SAFE STORAGE PROGRAM

Revision 0

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EXECUTIVE SUMMARY

On March 3, 1997, the Defense Nuclear Facilities Safety Board (Board) issued Recommendation 97-1 describing actions considered necessary to assure safe storage of ^{233}U bearing materials. The Secretary of Energy accepted Board Recommendation 97-1 on April 25, 1997, and the Implementation Plan (IP) for ^{233}U Safe Storage was transmitted to and accepted by the Board. With the IP as a management and technical plan, the Department of Energy (DOE) is resolving safety concerns expressed in Board Recommendation 97-1. The approach employs systems engineering principles to manage fissile materials and integrates DOE sites and programs involved in ^{233}U storage and disposition.

Starting in June 1999, this *Program Execution Plan (PEP) for the ^{233}U Safe Storage Program* becomes the overall planning document for completion of 97-1 IP activities and life cycle management of the DOE ^{233}U inventory. The PEP describes all efforts to be undertaken by DOE in responding to site assessment findings and analyses covered in the IP, and establishes the requirements for planning efforts undertaken by this Program. Tasks are identified to accomplish three major Program objectives:

1. Stabilize and maintain existing inventories of ^{233}U material in a safe manner

2. Bring materials within the scope of the Program into compliance with the *System Requirements Document (SRD) for the ^{233}U Safe Storage System* and the ^{233}U Safe Storage Standard, *Criteria for Packaging and Storing Uranium-233-Bearing Material* (DOE-SAFT-0067)

3. Store ^{233}U materials in a standard-compliant state in accordance with the *Record of Decision (ROD) for the ^{233}U Disposition Environmental Impact Statement (EIS*).

This PEP documents how the Program will identify, assess, and select an alternative(s) for dealing with the existing ^{233}U inventory. Additionally, it establishes the processes for completing near term activities started under the IP and overseeing and integrating projects that will implement the selected disposition alternative(s). It also defines the roles and responsibilities of the DOE organizations participating in the Program, as well as the necessary technical and management efforts integrated under the Program.

In developing the PEP, the DOE 97-1 Technical Team decided to employ the concept of a rolling three-year detailed planning window (starting with FY 1999, 2000, 2001) in order to focus on completing the objectives of the 97-1 IP as near-term activities. Long-term activities have been identified, and detailed planning efforts will be guided by a Program Logic Diagram using the systems engineering approach. Annual updates to the PEP will serve to further refine out-year activities in support of developing a comprehensive life-cycle management plan.

This PEP will continue to ensure that ^{233}U safety concerns expressed via the eight sub-recommendations contained in Recommendation 97-1 are addressed and do not recur. Safety concerns were addressed through the 18 IP commitments shown in Table ES-1; the applicable 97-1 sub-recommendation is shown in parentheses after each deliverable.

Table ES-1. Summary of Implementation Plan Commitments

Commitment Number	Deliverable ( ) indicate applicable Board sub-recommendation	Due Date	Status
1	^{233}U Waste Threshold Criteria (2)	May 1998	Submitted
2	Draft ^{233}U Safe Storage Standard (2)	April 1998	Submitted
3	Final ^{233}U Safe Storage Standard (2)	September 1998	Submitted. (see Board letter of 12/14/98)
4	LANL Initial Site Assessment Report (3,4)	December 1997	Submitted (See Board letter of 5/14/98)
5	ORNL Initial Site Assessment Report (3,4)	March 1998	Submitted (See Board letter of 5/14/98)
6	INEEL Initial Site Assessment Report (3,4)	March 1998	Submitted (See Board letter of 5/14/98)
7	LANL Final Site Assessment Report (3,4,5,6)	December 1998	Submitted
8	ORNL Final Site Assessment Report (3,4,5,6)	June 1999	Submitted
9	INEEL Final Site Assessment Report (3,4,5,6)	December 1998	Submitted
10	Small Holdings Sites Assessment Report (3,4,5,6) (if required)	December 1998	Submitted
11	Strategy for the Future Use and Disposition of ^{233}U (7)	January 1998	Submitted
12	Technical Competency Report (8)	January 1998	Submitted
13	Technical Data Handbook (8)	April 1999	Submitted
14	Building 3019 Alternatives Trade Study (4,7)	September 1998	Submitted
15	System Requirements Document (7)	March 1998	Submitted. (see Board letter 7/22/98).
16	System Design Document (7)—Combined with Systems Engineering activities under the PEP (See Section 4.4.1.4)	October 1998	Removed as a separate IP Commitment via letter from the Under Secretary to the Board on 10/22/98
17	^{233}U Safe Storage PEP (7)	December 1998	Submitted by this document
18	Annual Progress Reports (1)	January 1998 (annual)	Annual 1997 and 1998 versions submitted

( ) Sub-recommendation

The ^{233}U Program Technical Team (see Section ES-1) has served DOE well, as demonstrated by its performance under the 97-1 IP. The Team has met frequently and has actively supported the

completion of all scheduled IP commitments with timely actions and high-quality deliverables. Since the Secretary approved the IP, 16 of the 18 deliverables have been submitted to the Board. The IP stated that this PEP would address the following five program elements:

1) Organization
2) Work Breakdown Structure and Control System
3) Task Definitions
4) Multi -Year Schedule
5) Resources

The Program described herein is based on an extension of the successful practices developed by DOE and the ^{233}U Technical Team in implementing Board Recommendation 97-1. Based on the demonstrated institutionalization of this Program, DOE will propose closure of Recommendation 97-1 after completion of IP deliverables and a management evaluation of Program effectiveness. Continued Board oversight of ^{233}U Program activities is expected. Program elements are addressed in detail in the PEP and summarized as follows.

ES-1 Organization

The Assistant Secretary for Environmental Management (EM-1) has overall responsibility for leading DOE ^{233}U Program activities. The Deputy Assistant Secretary for Nuclear Material and Facility Stabilization (EM-60) is the Responsible Manager for DOE's Program and will oversee execution of activities.

The ^{233}U Technical Team formed under the IP is responsible for planning, prioritizing, and performing a technical review of issues and recommending site specific activities to achieve Program objectives. The Technical Team, chaired by DOE's Office of Environmental Management (EM), consists of representatives from program offices and sites involved in the Program. The Team advises and assists the Responsible Manager on technical and programmatic issues. The Technical Team chairman (who reports to EM-60) is responsible for leadership and coordination of Technical Team activities, with the active participation of cognizant oversight and programmatic offices.

Stabilization and storage activities conducted under the ^{233}U Safe Storage Program will occur primarily at the Idaho National Engineering and Environmental Laboratory (INEEL), Oak Ridge National Laboratory (ORNL), and Los Alamos National Laboratory (LANL). Activities to consolidate small quantities of ^{233}U will be coordinated by the Lawrence Livermore National Laboratory (LLNL) and conducted at various DOE sites, including New Brunswick Laboratory, Argonne National Laboratory (ANL)-East and West, Brookhaven National Laboratory, the Oak Ridge Y-12 Plant, the Hanford Site, and the Rocky Flats Environmental Technology Site.

ES-2 Work Breakdown Structure and Work Control System

The Program will employ a systems engineering approach to accomplish Program objectives. This approach is based on an analysis of system requirements, supported by assessments and trade studies that establish the basis for options and decisions.

A Work Breakdown Structure (WBS; see Section 4.4.2.2.1) provides the framework for managing scope, schedule, and cost. The WBS and an associated WBS dictionary, which defines work scope for each WBS element, will be updated to reflect approved changes throughout the life of the Program. Changes to the WBS and WBS Dictionary will be controlled in accordance with the *Configuration Management Plan (CMP) for the ^{233}U Safe Storage Program* (see Section 4.4.2.6).

Monitoring and control of the Program includes tracking cost, schedule, and technical performance against targets and controlling activities to achieve those targets. Individual sites will manage their costs in accordance with established budgeting and reporting processes. The Technical Team provides oversight, identifies and analyzes new issues, assesses the outcome of project activities, and initiates appropriate corrective actions.

ES-3 Task Definitions

Activities to accomplish Program objectives fall into three major categories: (1) near-term activities, (2) long-term activities, and (3) program support activities. Near-term activities are addressed in Section 4.2 and focus on stabilizing and maintaining the ^{233}U inventory at primary storage sites. These activities include:

- Inspect inventories and repackage, as appropriate, to meet the ^{233}U Safe Storage Standard
- Consolidate inventories from sites with small holdings to the primary storage sites (ORNL and/or INEEL)
- Maintain and upgrade current primary storage facilities as appropriate
- Determine if a portion of the ^{233}U inventory should be preserved as a national asset
- Complete an EIS and ROD for the disposition of excess ^{233}U.

Key Program milestones for near-term activities are listed in Table ES-2.

Table ES-2. Key Program Milestones

Performing Organization	Milestone	Milestone Date
^{233}U Technical Team	Finalize 233U Storage Standard	Jan 2000
	Begin implementation of long-term storage	Jan 2002
	Complete Technical Handbook	Apr 1999
ORNL	Final Site Assessment Report	June 1999
	Complete Phase I inspection/repackage	Sept 2000
	Prepare for repackaging	Sept 2000
	Complete Phase II inspection/repackage	Oct 2003
	Inspection and Repackaging Report	June 2000 (Annual)
INEEL	Complete examination of RWMC/LWBR pellets	Dec 1999
	Begin characterization/receipt/consolidation of RWMC drums	Jan 2001
	Complete recovery of RWMC drums	2018
LANL	Complete relocation of TA-18 material to CMR	Aug 1999
	Develop schedule for transfer to ORNL	Oct 1999
	Complete Transfer of LANL ^{233}U to ORNL	Oct 2002
Small Sites	Complete consolidation Plan	Sept 1999
	Complete relocation to primary storage site(s)	Sept 2000
Material Disposition	Engineering Studies	May 2000
	Notice of Intent	Sept 2000
	Draft EIS	Sept 2001
	Final EIS	Apr 2002
	Record of Decision	May 2002
	Earliest Start for Implementation of Disposition Activities	May 2002

Long-term activities are addressed in Section 4.3 and will ensure the safe, long-term management of ^{233}U under any of the following alternatives: (1) disposition in a national waste repository, (2) indefinite storage as a national asset, (3) transition to a beneficial use application, or (4) continued storage. Quantities of existing material that will flow to each of these alternatives will be determined in the *ROD for the ^{233}U Disposition EIS*. Proceeding with the ^{233}U Disposition EIS within the timeframe given is dependent upon the availability of disposition facilities and the results of engineering studies to ensure the technical viability of a disposition approach. DOE's Office of Defense Programs (DP) and EM will establish plans for closeout and disposition of existing facilities no longer required for ^{233}U as a result of these decisions.

Based on an analysis of system requirements, supported by trade studies to establish the basis for the decisions and milestones in Table ES-2 and Figure ES-1, program support functions will provide the means to achieve Program objectives. As described in Section 4.4, Systems Engineering, Program Management, Quality Assurance, and Technical Support represent the resources that will develop and execute the plans for moving the Program forward.

ES-4 Multi-Year Schedule

Figure ES-1 shows the key activities for the Program, with site-by-site schedule data for the FY1999 through FY2001 planning period appearing in Sections 4.2 and 4.4. Annual updates to this PEP will extend these schedules year-by-year. An integrated schedule will also be maintained for the Program.

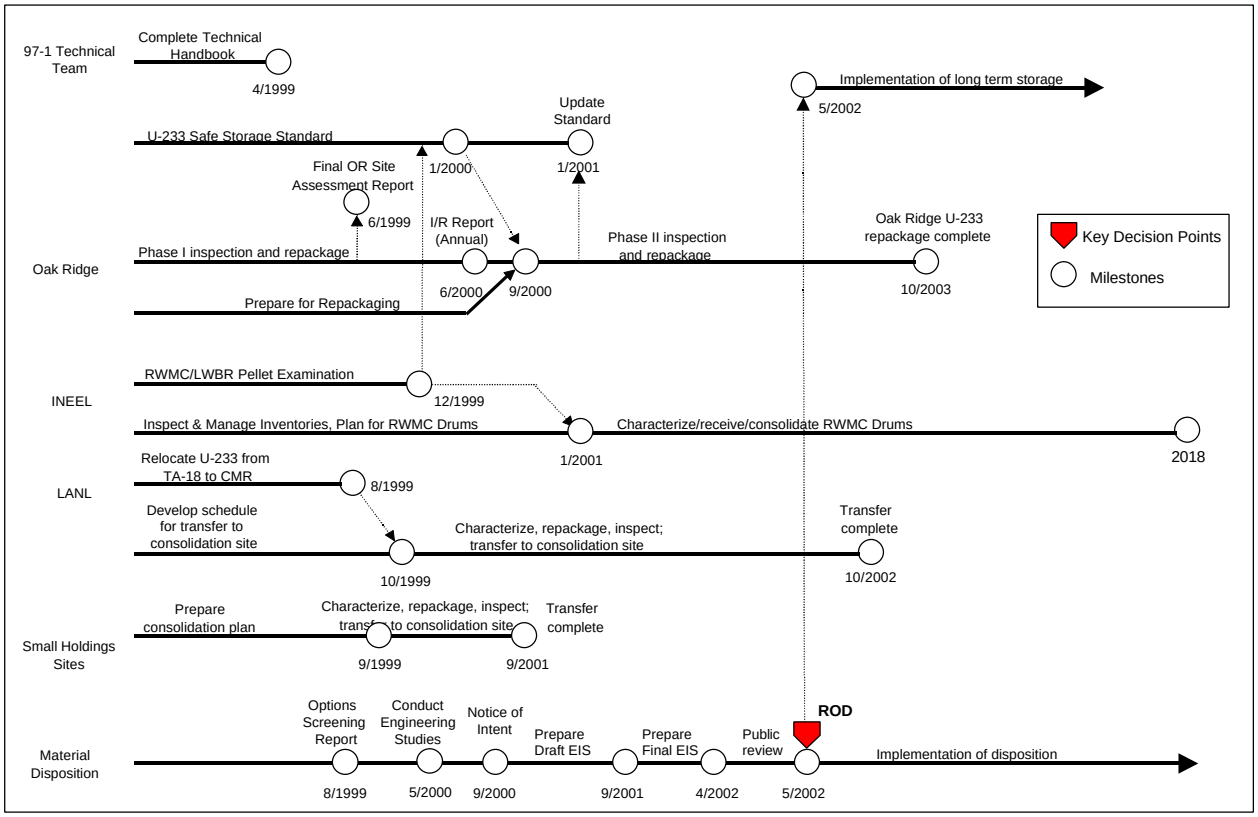

Figure ES-1. Schedule of Key Program Milestones.

ES-5 Resources

Total Program costs for FY 1999, FY 2000, and FY 2001 are summarized by funding organization in Table ES-3. Estimated costs of each task are addressed in detail by site and by funding organization in Section 5. Each site, through coordination with its technical team representative, is responsible for organizing, developing, and managing site resources to accomplish planned tasks. Sections 4.4.2.1 and 4.4.2.3.2 describe the processes for budget planning and funds management.

Table ES-3. Total Program Cost Estimates by Funding Organization

Funding Organization	FY 1999	FY 2000	FY 2001
DP	$13,570,000	$13,184,000	$14,866,000
EM	$1,000,000	$1,740,000	$3,132,000
MD	$780,000	$3,000,000	$7,200,000
ER (SC)	$0	$45,000	$20,000
NE	$0	$85,000	$36,000
Program Total	**$15,350,000**	**$18,054,000**	**$25,254,000**

ES-6 Associated Documents

This PEP is augmented by several key documents that address specific technical and management activities for the Program. These include the CMP; the *TBD/TBR Resolution Plan for the System Requirements Document*; the *Conceptual Design Description* (CDD), which builds on the long-term storage system description contained in the SRD; the *Program Logic Diagram* (PLD), and the *Systems Engineering Management Plan* (SEMP). Integrated cost and schedule baselines and a WBS dictionary are under development and will also augment the PEP. These documents will be provided to the Board for review upon completion.

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ACRONYMS

^{233}U	Uranium-233
ALARA	as low as reasonably achievable
AMWT	Advanced Mixed Waste Treatment
ANL	Argonne National Laboratory
CDD	Conceptual Design Description
CFR	Code of Federal Regulations
CM	Configuration Management
CMP	Configuration Management Plan
CMR	Chemical and Metallurgical Research
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
-DP	Office of Defense Programs
-EH	Office of Environment, Safety and Health
-EM	Office of Environmental Management
-ER (SC)	Former Office of Energy Research, now the Office of Science
-MD	Office of Fissile Materials Disposition
-NE	Office of Nuclear Energy, Science, and Technology
EIS	Environmental Impact Statement
ES&H	Environment, Safety and Health
FY	Fiscal Year
HEU	High-Enriched Uranium
INEEL	Idaho National Engineering and Environmental Laboratory
IP	Implementation Plan
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
LWBR	Light Water Breeder Reactor
MSRE	Molten Salt Reactor Experiment
NDA	Non-destructive Assay
NDE	Non-destructive Examination
NEPA	National Environmental Policy Act
NMI	Nuclear Materials Integration
NOI	Notice of Intent
ORNL	Oak Ridge National Laboratory

PEP	Program Execution Plan
PLD	Program Logic Diagram
QA	Quality Assurance
RAM	Reliability, Availability, and Maintainability
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SAFT	Draft DOE Standard
SAR	Safety Analysis Report
SDD	System Design Description
SEMP	Systems Engineering Management Plan
SNF	Spent Nuclear Fuel
SRD	System Requirements Document
TBD	To Be Determined
TBR	To Be Resolved
TPM	Technical Performance Measure
WBS	Work Breakdown Structure

GLOSSARY

Characterize. To identify of waste composition and properties, whether by review of process knowledge, nondestructive examination or assay, or sampling and analysis, to determine appropriate storage, treatment, handling, transportation, and disposal requirements.

Configuration Management. An integrated management program that establishes consistency among design requirements, physical configuration, and facility documentation, and maintains this consistency throughout the life of the facility as changes occur. The CM program consists of CM functions associated with the following program elements: program management, design requirements, document control, change control, and assessments. The CM program also includes design reconstitution and material condition and aging management as adjunct programs.

Cost Baseline. A budget, based on the technical baseline cost estimate, that is time-phased in accordance with the project schedule. The cost baseline is subject to formal change control, and normally contains direct and indirect budget; management reserve budget; undistributed budget and higher level budgets; contingency amount; and amount for fee, as appropriate.

Disposal. The release of property following destruction or conversion to minimize health risks and costs for continued storage and monitoring.

Disposition. Disposal, beneficial use, and/or standard-compliant storage of non-weapons usable ^{233}U materials for a period of not less than 50 years.

Environmental Impact Statement. An EIS is defined at 40 CFR 1508.11 as a "detailed written statement", which documents a federal agency's analysis of the environmental consequences resulting from major federal actions. A Notice of Intent (NOI) to prepare an EIS must be published in the *Federal Register* by DOE, and made available to the public.

Functional Analysis. Examination of a defined function to identify all the subfunctions necessary to the accomplishment of that function. The subfunctions are arrayed in a functional architecture to show their relationships and interfaces (internal and external). Upper-level performance requirements are flowed down and allocated to lower-level subfunctions.

Implementation Plan. An IP is the official response format for the DOE response to a Board Recommendation. Normally developed in the 90-day period after acceptance of the Recommendation by DOE.

Integrated Program Schedule. An integration of the cost and schedule baselines to provide a total picture of the time sequence of projected costs for the program.

Long-term. Those specific activities necessary to (1) bring those materials within the scope of the Program into compliance with the SRD and the ^{233}U Safe Storage Standard and (2) store them in a standard-compliant state in accordance with the *ROD for the ^{233}U Disposition EIS*.

Master Schedule. The master schedule should show the date for completion and proposed activity. It should include major milestones, including decision points, with sufficient detail to determine when funding will be required, by fiscal year, to meet the master schedule.

Near-term. Activities conducted to stabilize and/or maintain the material inventory in a safe state prior to the decision to disposition or store the materials for the long term.

Performance Measures. A process of assessing progress toward achieving predetermined goals usually expressed in a Performance Measurement Baseline. The total allocated budget less management reserve. It is the time phased budget plan against which contract performance is formally measured. The performance measurement baseline includes budgets assigned to control accounts and undistributed budgets.

Program Baseline. A quantitative expression of projected costs, schedule, and technical requirements. Baseline establishment should include criteria to serve as a base or standard for measurement during the performance of an effort. It is the data plan against which the status of resources and the progress of a project can be measured.

Program Logic Diagram. The PLD is a pictorial representation of the overall set of tasks for managing the Program life cycle using a systems engineering approach.

Recommendation 97-1. On March 3, 1997, the Board issued this recommendation addressing the safe storage of separated U-233 bearing material. It describes actions that the Board considers necessary to improve the safe storage of U-233 bearing materials in the interim and the longer term.

Record of Decision. Following the Final EIS, as part of the NEPA process, a ROD is rendered and subsequently published by DOE in the *Federal Register* documenting decisions resulting from the EIS process.

Requirements Analysis. The determination of system specific characteristics based on analysis of customer needs, requirements and objectives; missions; projected utilization environments for people, products and processes; and measures of effectiveness. Requirements analysis assists the customers in refining their requirements in concert with defining functional and performance requirements for the system's primary life cycle functions. It is a key link in establishing achievable requirements that satisfy needs.

Risk Management. Risks can take the form of technology, cost, and/or schedule risks. Risk Management (RM) is the method used to identify, analyze, and mitigate hazards and potential deviations from technical, cost, and schedule parameters. RM is integrated with established engineering management techniques such as contingency planning, test and evaluation, technical performance measurement, and performance assessment.

Schedule Baseline. The time phased plan with a logical sequence of interdependent activities, milestones and events necessary to complete the project.

Schedule. The known time related requirements and restraints affecting the Project or program. Schedule should integrate with the work breakdown structure and cost estimate, and represent all technical work scope regardless of the funding source.

Site Assessment. This is the set of actions described in the 97-1 IP that constitutes the initial response to the recommendation by performing an in-depth assessment of the status and condition of the inventory of ^{233}U materials in DOE's possession.

Synthesis. A synthesis process translates the functional allocation into a physical architecture by grouping functions and subfunctions into logical physical elements that will make up the end product. These physical elements will be composed of hardware, software, material, data, facilities, people, services, and/or processes. Alternatives are analyzed to determine which best satisfies allocated functional and performance requirements, derived requirements, interface requirements, and constraints. The synthesis process defines and integrates the physical architecture to a level of detail that enables verification that functional and performance requirements have been met. The process translates the architecture into a work breakdown structure, specifications, and configuration baselines.

System Integration. The procedures involved in combining separately developed sub-systems or components so that they work together as a complete system. It may involve the combining of subsystems each with numerous interfaces for the input and output of data, materials, signals or energy, each with specified functions vital to the planned success of the main system.

System Analysis and Trades. The process of assessing system effectiveness and risks, developing and validating system models, and performing trade studies in an effort to balance cost, schedule, performance, and risk.

System Planning. Planning activities and detailed studies conducted to define the scope, schedule, and total project cost to provide a baseline for the project from which to measure performance. The information should be sufficiently detailed and reliable to support the Approval of the Baseline Critical Decision.

Technical Baseline. A configuration identification document or set of documents formally designated and approved by DOE. The Conceptual Design Report is the initial project technical baseline. It, plus DOE approved changes, constitutes the current technical baseline.

Uranium-233. A man-made uranium isotope, primarily formed as a result of neutron irradiation of thorium-232 (Th-232), that can potentially be used as fuel for nuclear reactors and as nuclear weapons material.

Validation and Verification. Validation is the process of confirming that the requirements baseline meets the customer expectations, project and enterprise constraints, and external constraints. Verification, on the other hand, is the process of confirming that deliverable hardware and software are in compliance with the functional, performance, and design requirements. Process steps include verifying the functional architecture satisfies the validated

requirements baseline, and verifying the physical architecture requirements are traceable to the verified functional architecture and satisfy the validated requirements baseline.

Work Breakdown Structure. A multi-tiered framework which organizes and graphically displays elements representing work to be accomplished in logical relationships. The work breakdown structure may or may not be product-oriented; orientation may be towards products, project phases, key decision points, various budgeting units of measure, e.g. activity data sheets, or a combination. The work breakdown structure should be organized such that each element can be estimated, scheduled, budgeted, and work progress reported.

1 INTRODUCTION

1.1 Purpose

This *Program Execution Plan (PEP) for the ^{233}U Safe Storage Program* is the overall management policy and planning document for completion of 97-1 Implementation Plan (IP) activities and life cycle management of the DOE ^{233}U inventory. The IP, developed in response to Board Recommendation 97-1, addressed the fact finding and immediate responses to concerns regarding safety of the ^{233}U inventory. This PEP documents how the Program will methodically identify, assess, and select alternatives for dealing with the inventory. Additionally, it establishes the processes for overseeing and integrating projects that will implement the selected alternative and continuing near-term activities started under the IP.

The PEP describes all efforts to be undertaken by the Department of Energy (DOE) in responding to the findings of the site assessments and analyses covered in the IP and establishes the requirement for planning efforts that will be undertaken under this Program. It defines the roles and responsibilities of the DOE organizations participating in the Program, as well as necessary technical and management efforts and how they are integrated under the Program. For the purposes of this document, the following definitions apply:

- Near-term: Activities conducted to stabilize and/or maintain the material inventory in a safe state.

- Long-term: Those specific activities necessary to (1) bring those materials within the scope of the Program into compliance with the *System Requirements Document for the ^{233}U Safe Storage System* (SRD) and the ^{233}U Safe Storage Standard, *Criteria for Packaging and Storing Uranium-233-Bearing Material* (DOE-SAFT-0067), and (2) store them in a standard-compliant state in accordance with the *Record of Decision (ROD) for the ^{233}U Disposition Environmental Impact Statement (EIS)*.

- Disposition: Disposal, beneficial use, and/or standard-compliant storage of non-weapons usable ^{233}U materials for a period of not less than 50 years.

This PEP will be updated annually (by January of each year), in concert with the DOE budget process, to reflect evolutions in Program scope and to address new activities identified throughout the Program life cycle. Cost for activities identified herein are estimated only through FY 2001; out-year estimates will be added as out-year activities are identified and updated in this PEP. All updates will fall under the purview of the Program's Configuration Management (CM) process, as described in the *Configuration Management Plan (CMP) for the ^{233}U Safe Storage Program*.

1.2 Scope

This PEP is applicable to ^{233}U in separated forms in storage at Idaho National Engineering and Environmental Laboratory (INEEL), Oak Ridge National Laboratory (ORNL), Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and at various

DOE sites with small inventories of ^{233}U (hereafter referred to as "sites with small holdings"). These sites include New Brunswick Laboratory, Argonne National Laboratory (ANL)-East and West, Brookhaven National Laboratory, the Oak Ridge Y-12 Plant, the Hanford Site, and Rocky Flats Environmental Technology Site.

Material currently at licensed facilities or facilities under the purview of the Naval Reactors Program is out of scope. Should any of this separated material be transferred to DOE, the ^{233}U Program scope will be expanded to include this inventory. Spent nuclear fuel (SNF) containing ^{233}U—located at the INEEL, Savannah River Site, and other sites—is also considered out of scope unless this inventory is dispositioned in a manner that stabilizes the ^{233}U SNF into a separated form. Similarly, the ^{233}U associated with the Molten Salt Reactor Experiment (MSRE) is addressed under the IP for Board Recommendation 94-1 and is, therefore, outside the scope of this PEP. However, once the ^{233}U material is removed from MSRE and stabilized, the scope of this PEP will be expanded to include this inventory as well. Most sites have stored wastes containing ^{233}U. Most of this waste will likely be excluded from consideration by this PEP, once the waste threshold criteria have been established (see Table 2-1, Commitment 1).

1.3 Program Objectives

The objectives of the ^{233}U Safe Storage Program are (1) stabilize and maintain existing inventories of ^{233}U material in a safe state, (2) bring materials within the scope of the Program into compliance with the SRD and ^{233}U Safe Storage Standard, and (3) store them in a standard-compliant state, in accordance with the ROD. In support of these objectives, seven key actions have been identified:

1. Characterize materials and evaluate storage systems to improve the current information base

2. Implement measures to ensure safe and secure storage

3. Implement storage strategies designed to permit transition to future disposition options

4. Define ownership and overall programmatic control for the management of ^{233}U material

5. Ensure risks to personnel and the environment meet the ALARA philosophy

6. Ensure programmatic direction is integrated with the evolving national policy for fissile material stewardship

7. Identify the resources needed to execute this PEP and ensure their timely availability.

These actions are being addressed through various site-specific activities identified in Section 4.

1.4 Program Background

^{233}U is a man-made uranium isotope formed as a result of neutron irradiation of Thorium-232 (^{232}Th). Due to the lack of funding and facilities to handle the significant radiation emissions

from these materials, many of the ^{233}U packages have not been inspected for years and their condition is, in some cases, unconfirmed, resulting in concerns expressed by the Board in Recommendation 97-1.

1.4.1 Board Recommendation 97-1, DNFSB/Tech-13, and the HEU Vulnerability Assessment

On March 3, 1997, the Board issued Recommendation 97-1 describing actions that the Board considers necessary to improve the safe storage of ^{233}U-bearing materials. The Secretary of Energy accepted Recommendation 97-1 on April 25, 1997, and DOE's 97-1 IP was transmitted to and accepted by the Board in September 1997.

Recommendation 97-1 was preceded in February 1997, by a Board technical report entitled *Uranium-233 Storage Safety at Department of Energy Facilities*, DNFSB/TECH-13. The report described the Board's perspective regarding the safety of ^{233}U stored at various sites in the DOE complex and acknowledged DOE's Highly Enriched Uranium (HEU) Vulnerability Assessment. At the time Recommendation 97-1 was issued, DOE's Office of Defense Programs (DP) had undertaken the development of a plan describing the necessary corrective actions for the most significant vulnerabilities, including those involving ^{233}U, identified in the HEU Vulnerability Assessment. The *HEU Vulnerability Corrective Action Plan* was issued on June 13, 1997, and is managed by DP.

1.4.2 Other Related Board Recommendations and DOE Programs

In addition to Recommendation 97-1 and the HEU Vulnerability Assessment, other related Board Recommendations have potential impacts on the ^{233}U Safe Storage Program, including the following:

- The Board has issued and the Secretary of Energy has accepted recommendations (90-2, 91-1, 92-5, and 94-5) concerning the use of standards by contractors at DOE defense nuclear facilities, and the level of Conduct of Operations to be maintained at these facilities. The Board subsequently combined and modified these recommendations in Recommendation 95-2.

- Board Recommendation 97-2 addresses the continuation of criticality safety at defense nuclear facilities in the DOE complex.

- Board Recommendations 95-2 and 98-1 addresses Integrated Safety Management (ISM) at DOE defense nuclear facilities.

- Board Recommendation 94-1 concerning the safe storage and disposal of Plutonium has direct bearing on the ^{233}U Safe Storage Program. The 94-1 Program developed a plutonium storage standard (DOE-STD-3013-96) that served as a precedent for DOE-SAFT-0067. Additionally, the stabilization of the MSRE fuel (^{233}U) at ORNL is a 94-1 action that will eventually result in additional ^{233}U material for management under the ^{233}U Safe Storage Program.

Other DOE programs also have the potential to affect the ^{233}U Safe Storage Program. The Nuclear Materials Integration (NMI) effort is addressing whether ^{233}U can be considered a national resource through a recommendation for an independent study regarding the value of numerous nuclear materials. DOE is also assessing ways to better manage nuclear materials through cooperative efforts, such as co-location and/or co-utilization of facilities, cooperation on standards, prioritization of efforts, technology selection and availability, and cooperation on transportation of nuclear materials.

1.5 Document Overview

This PEP for the ^{233}U Safe Storage Program consists of five major sections. Detailed descriptions of each section are as follows:

- *Section 1.* Section 1 provides introductory and historical information regarding Board Recommendation 97-1 and the scope of the ^{233}U Safe Storage Program.

- *Section 2.* Section 2 identifies key Program drivers and addresses the Program's status in completing 97-1 IP commitments.

- *Section 3.* Section 3 describes the current Program organizational structure and defines roles and responsibilities for key Program personnel.

- *Section 4.* Section 4 identifies key near-term, long-term, and program support activities identified to date. Subsections are organized to correspond with top-level work breakdown structure (WBS) elements (see Figure 4-2), with summary cost and schedule information provided in associated tables in each subsection. Additional activities will be added to future PEP updates as they are identified.

- *Section 5.* Section 5 provides detailed cost information for the various subtasks associated with the top-level activities addressed in Section 4.

1.6 Associated Documents and Activities

This PEP is augmented by several key documents that address specific technical and management activities for the Program. These associated documents provide necessary details on the management and activities of this Program. These include the CMP; the *TBD/TBR Resolution Plan for the SRD*; the *Conceptual Design Description* (CDD), which builds on the long-term storage system description contained in the SRD; the *Program Logic Diagram* (PLD); and the *Systems Engineering Management Plan* (SEMP). Integrated cost and schedule baselines and a WBS dictionary are under development and will also augment the PEP.

As the Program proceeds, additional documentation will be developed to support management and decision-making for the Program. These will include various trade studies, the *^{233}U Disposition EIS*, the *ROD for the ^{233}U Disposition EIS*, risk analyses, functional and operational decomposition analyses, and extensive design-related documentation for the selected storage and disposition alternative(s). A complete document hierarchy is contained in the SEMP.

2 PROGRAM DRIVERS

The primary drivers for the Program are Recommendation 97-1, the HEU Vulnerability Assessment (described in Section 1.4.1), and DOE commitments to the Board documented in the 97-1 IP. These drivers are discussed in the following subsections.

2.1 Board Recommendation 97-1

In Recommendation 97-1, the Board outlined eight sub-recommendations that it considers necessary to adequately address DOE ^{233}U materials. The eight sub-recommendations are as follows:

1. Establish a single line project to deal with issues attached to safe storage of ^{233}U

2. Develop the standards to be used for packaging, transportation, and interim and long-term storage

3. Characterize the items of ^{233}U presently in storage in DOE defense nuclear facilities as to material, quantity, type and condition of storage container

4. Evaluate the conditions and appropriateness of the vaults and other storage systems used for the ^{233}U at DOE facilities

5. Assess the state of storage of the items of ^{233}U in light of the standards mentioned in sub-recommendation 2 above

6. Initiate a program to remedy any observed shortfalls in ability to maintain the items of ^{233}U in acceptable interim storage

7. Establish a plan for the measures that can eventually be used to place the ^{233}U in safe permanent storage

8. Until these ultimate measures are taken, ensure that DOE retains the residue of technical knowledge and competence needed to carry through all of the measures needed to ensure safe storage of the ^{233}U-bearing material in the short- and the long-term.

2.2 97-1 Implementation Plan

DOE response to Recommendation 97-1 is contained in the 97-1 IP, which commits DOE to developing a strategy for safe storage of ^{233}U until final determination of material disposal and/or beneficial use. Simultaneously, DOE is committed to addressing all the sub-recommendations in Board Recommendation 97-1 through a methodical process. During this process, the safety of existing ^{233}U storage is ensured through site assessments, surveillance activities, and safety assurance actions. Significant safety problems identified through this process will be corrected.

The IP also commits the DOE to a program that will establish a long-term solution for safe ^{233}U storage throughout the complex. The best solution will be selected using a systems engineering process to fully define the program mission, requirements, available options, and system concept.

A summary and status of IP commitments is provided in Table 2-1. This PEP satisfies Commitment 17 and follows the IP in that it incorporates all continuing IP commitments and identifies efforts to address long-term storage, disposal, or beneficial use.

Table 2-1. Implementation Plan Commitments

Commitment Number	Deliverable ( ) indicate applicable Board sub-recommendation	Due Date	Status
1	^{233}U Waste Threshold Criteria (2)	May 1998	Submitted
2	Draft ^{233}U Safe Storage Standard (2)	April 1998	Submitted
3	Final ^{233}U Safe Storage Standard (2)	September 1998	Submitted. (see Board letter of 12/14/98)
4	LANL Initial Site Assessment Report (3,4)	December 1997	Submitted (See Board letter of 5/14/98)
5	ORNL Initial Site Assessment Report (3,4)	March 1998	Submitted (See Board letter of 5/14/98)
6	INEEL Initial Site Assessment Report (3,4)	March 1998	Submitted (See Board letter of 5/14/98)
7	LANL Final Site Assessment Report (3,4,5,6)	December 1998	Submitted
8	ORNL Final Site Assessment Report (3,4,5,6)	June 1999	Submitted
9	INEEL Final Site Assessment Report (3,4,5,6)	December 1998	Submitted
10	Small Holdings Sites Assessment Report (3,4,5,6) (if required)	December 1998	Submitted
11	Strategy for the Future Use and Disposition of ^{233}U (7)	January 1998	Submitted
12	Technical Competency Report (8)	January 1998	Submitted
13	Technical Data Handbook (8)	April 1999	Submitted
14	Building 3019 Alternatives Trade Study (4,7)	September 1998	Submitted
15	System Requirements Document (7)	March 1998	Submitted. (see Board letter 7/98).
16	System Design Document (7)—Combined with systems engineering activities under the PEP (See Section 4.4.1.4)	October 1998	Removed as a separate IP Commitment via letter from the Secretary to the Board on 10/22/98.
17	^{233}U Safe Storage PEP (7)	December 1998	Submitted by this document

18	Annual Progress Reports (1)	January 1998 (annual)	Annual, 1998 version submitted

( ) Sub-recommendation

2.3 Planning Assumptions

The Program team has established a set of key assumptions to provide a basis for ongoing plans and activities. Planning assumptions for the Program have been categorized as Policy Assumptions, Program Assumptions, and Technical Assumptions, as outlined in the following sections.

2.3.1 Policy Assumptions

1. The Safe Storage Program will be managed by DOE's Office of Environmental Management (EM).

2. Materials within program scope are those materials listed in the SRD.

3. The Waste Threshold Criteria for ^{233}U provides a basis to distinguish between materials to be managed under the program and those managed as waste.

4. Decisions regarding the disposition of ^{233}U will be made in the EIS to be prepared by DOE's Office of Fissile Materials Disposition (MD) in coordination with the Program.

5. Decisions regarding the selection and timing of wastes to be transferred to EM-30 are the responsibility of EM, with input from the technical team.

6. All DOE sites not currently scheduled to be closed are potential sites for long-term ^{233}U storage and processing and will be considered in the analysis of alternative sites. The primary sites under consideration are INEEL, ORNL, SRS, and Hanford due to their defined long-term missions regarding nuclear materials.

7. ^{233}U-bearing wastes not listed in the SRD are the responsibility of EM-30; the disposal of these wastes will not be addressed under this Program.

8. The Technical Team Chairman will coordinate with the NMI program to forward to the Secretary of Energy options and recommendations regarding managing "national asset" materials; storage, disposal, and beneficial use options; and other recommendations regarding ^{233}U.

9. Technical competency will be maintained at levels needed to support the Program.

2.3.2 Programmatic Assumptions

Note: Programmatic assumptions are numbered consecutively as a continuation of Policy Assumptions (see Section 2.3.1).

10. MD will issue the ROD for the disposition of ^{233}U not later than 5/1/02.

11. Excess ^{233}U material at sites with small holdings will be consolidated at ORNL and/or INEEL, and the transfers will reduce risk or cost.

12. ORNL and INEEL inventories will not be relocated to meet near-term objectives.

13. Long-term solutions regarding storage, disposal, and/or beneficial use of the material will employ existing facilities and capabilities, to the extent possible.

14. Because costing methods for critical activities (i.e., safeguards and security) differ from site to site, normalized life-cycle costs will be used as a basis for comparing storage, disposal, and beneficial use alternatives.

15. Wastes generated by the operation of the Safe Storage System will be transferred to EM-30 for disposal.

16. Existing material determined to be waste will be managed by EM-30 rather than introduced into the Safe Storage System.

2.3.3 Technical Assumptions

Note: Technical assumptions are numbered consecutively as a continuation of Policy and Programmatic Assumptions (see Sections 2.3.1 and 2.3.2).

17. In addition to storage of homogeneous ^{233}U, storage of mixed ^{233}U, Pu, enriched U and other special nuclear materials and/or mixtures of those materials will be considered in assessing the options available to the Program.

18. A ^{233}U isotopic concentration of less than 12wt% ^{233}U in ^{238}U (equivalent to <20% ^{235}U), consistent with additional constraints as documented in *Definition of Weapons Usable Uranium-233*, ORNL/TM-13517, is considered non-weapons usable.

19. The Safe Storage System will be capable of accepting isotopic concentrations up to 100% ^{233}U.

20. The capacity of the Safe Storage System will be sufficient to accommodate the entire inventory of materials listed in the SRD.

21. The only material paths that will be analyzed under the Program are:

    - Near-term Storage
    - Processing and Long-term Storage
    - Disposal
    - Beneficial Use

- Programmatic Use
- No Action

22. Packaging and material forms will be compatible with disposition paths to minimize the need for future repackaging.

23. Stored material will be retrievable.

24. Pending issuance of a final DOE standard for the safe storage of ^{233}U material, draft standard DOE-SAFT-0067 will provide guidance for inspections and surveillance to meet near-term objectives.

3 PROGRAM ORGANIZATION

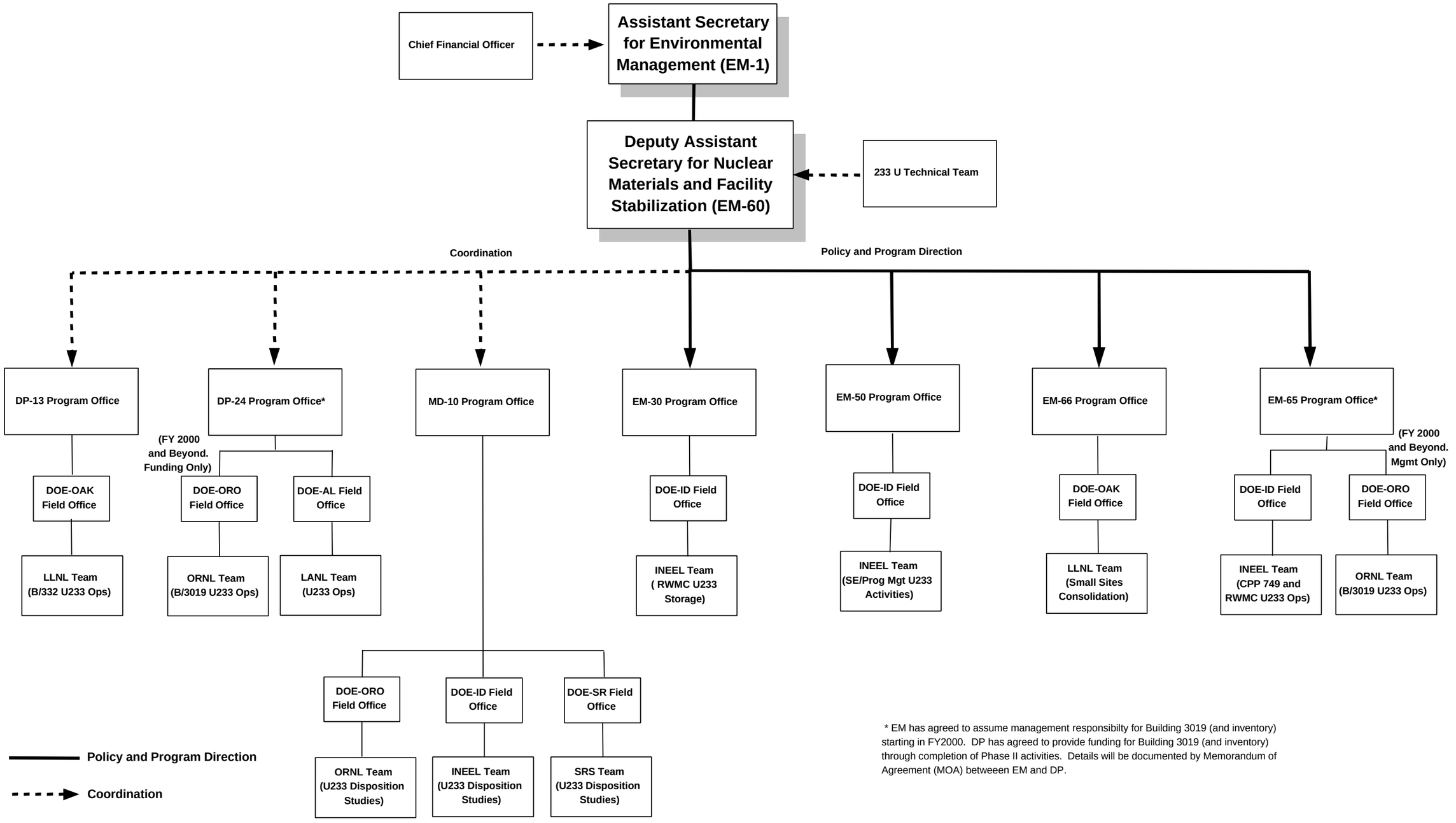
The Program organization accommodates three prospective material paths—storage, disposal, and beneficial use—by integrating the various Program Office efforts. The organizational structure is shown in Figure 3-1. The current program operates through normal field elements of DOE, following the strategy described in Section 4. Any required actions identified as necessary for safe storage under the current site assessments will be implemented as necessary by the organizations described in Section 3.1, with funding supplied as described in Section 5.1.

3.1 Current Program Organization

Although the Program is not organized within a single DOE office, line management is responsible for conducting the work safely. Specifically, the Assistant Secretary for Environmental Management (EM-1) has overall responsibility for leading Program activities. The Deputy Assistant Secretary for Nuclear Materials and Facilities Stabilization (EM-60) is the Responsible Manager for the Program and will oversee the execution of activities.

The chartered ^{233}U Technical Team, which was formed under the 97-1 IP, advises and assists the Responsible Manager on technical and programmatic issues involving the implementation of crosscutting activities in the Program. The Technical Team is chaired by EM and consists of representatives from the Program Offices and sites involved in the ^{233}U Program, as well as participation and oversight from Board staff. Clearly defined roles and responsibilities for this program organization appear in Sections 3.1.1 through 3.1.7. DP and EM are negotiating an MOA under which EM would assume management responsibility for Building 3019 (and inventory) at ORNL starting in FY2000. Additionally, DP would agree to provide funding for Building 3019 (and inventory) through completion of Phase II activities. Details will be documented by Memorandum of Agreement (MOA) between EM and DP.

The cross-organizational Technical Team has served DOE well, as demonstrated by its performance under the 97-1 IP. The Team has met frequently and has actively supported the completion of all scheduled IP commitments with timely actions and high-quality deliverables. In the 15 months since the Secretary approved the IP, 16 of the 18 deliverables have been submitted (see Table 2-1). The final two deliverables are due in 1999, and DOE expects this record of performance to continue under the PEP since the IP organization structure shown in Figure 3-1 will remain in place.



* EM has agreed to assume management responsibilty for Building 3019 (and inventory) starting in FY2000. DP has agreed to provide funding for Building 3019 (and inventory) through completion of Phase II activities. Details will be documented by Memorandum of Agreement (MOA) betweeen EM and DP.

Figure 3-1. Current ^{233}U Organization Structure

3.1.1 Assistant Secretary for Environmental Management

The Assistant Secretary for Environmental Management is responsible for:

- Clearly and uniquely describing activities required to meet 97-1 IP and PEP commitments and their associated funding levels in the appropriate annual budget justification narratives, consistent with the requirements defined and recommended by the Technical Team and the Responsible Manager.

- Coordinating and managing the implementation of the 97-1 IP and the PEP throughout the DOE.

- Reporting significant budget shortfalls or deviations in the budget execution plans associated with ^{233}U activities to the Deputy Secretary, and requesting assistance from the Chief Financial Officer to resolve budget shortfalls.

3.1.2 Responsible Manager (Deputy Assistant Secretary for Nuclear Materials and Facilities Stabilization)

The Responsible Manager is responsible for:

- Reviewing the Program activities recommended by the Technical Team and ensuring that the activities are consistent with the 97-1 IP and the PEP.

- Formally notifying and recommending to the three primary Program Offices (DP, EM, and MD), at the appropriate time in the budget formulation process, the levels to include in their initial funding targets for the budget formulation process. Recommendations for Program Office funding requirements should be consistent with each office's participation in Program activities and the Program Office and field office responsibilities described in DOE M 411.1-1, *DOE Manual of Safety Management Functions, Responsibilities, and Authorities* (FRAM).

- Reporting any budget shortfalls or deviations in the budget executions associated with the 97-1 IP and the PEP to the Assistant Secretary for Environmental Management.

3.1.3 Assistant Secretary for Defense Programs and Director of the Office of Fissile Materials Disposition

The Assistant Secretary for Defense Programs and Director of the Office of Fissile Materials Disposition are responsible for:

- Clearly and uniquely describing activities required to meet 97-1 IP and PEP commitments and their associated funding levels in the appropriate annual budget justification narratives, consistent with the requirements defined and recommended by the Responsible Manager.

- Informing the Responsible Manager, in writing and with justification, of any deviations in planning or execution from the activity and funding descriptions that were defined and recommended by the Responsible Manager.

3.1.4 DP, EM, ER (SC), MD, and NE Program Offices

The DP, EM, ER (SC), MD, and NE program offices are responsible for:

- Performing their program management functions and funding their commitments.

- Executing their funding consistent with the Responsible Manager's recommendation once funding is appropriated.

- Taking the actions necessary to ensure that the activity and funding requirements from the Responsible Manager are included in their budget formulation, including coordination with the appropriate operations, field, and area offices.

- Ensuring that Program activities are uniquely described at the project level within their budget justification narratives, along with milestones and performance measures, as appropriate.

- Ensuring that descriptions of Program activities and associated funding are identified in clearly delineated terms (i.e., stand-alone and not described as one of several related activities).

3.1.5 Chief Financial Officer

The Chief Financial Officer is responsible for:

- Ensuring that Program activities are uniquely delineated within the budget justification narratives.

- Monitoring program budget execution for PEP activities throughout the fiscal year.

- Assisting in resolving budget shortfalls or budget execution issues that may impact the timely implementation of PEP commitments.

3.1.6 Field Offices

Field offices are responsible for planning and performing the work required to meet the IP and PEP.

3.1.7 ^{233}U Technical Team

The technical team consists of representatives from the following program offices and sites involved in the ^{233}U Safe Storage Program:

DOE Offices:
Defense Programs (DP)
Environmental Management (EM)
Environment, Safety, and Health (EH)
Fissile Materials Disposition (MD)

Sites:
Oak Ridge National Laboratory
Idaho National Engineering and Environmental Laboratory
Los Alamos National Laboratory
Lawrence Livermore National Laboratory
Savannah River

The technical team, chaired by EM, advises and assists the responsible manager on technical and programmatic issues. The team chairman (who reports to the Deputy Assistant Secretary for Nuclear Materials and Facilities Stabilization) is responsible for leading and coordinating technical team activities. The chairman provides information and reports to the Board staff on a periodic basis.

The technical team is specifically responsible for:

- Planning, documenting, and updating Program activities in this PEP.
- Providing peer review of technical issues and products.
- Preparing recommendations on the annual scope of program activities and the associated funding levels, consistent with the 97-1 IP and the PEP. Recommendations for Program Office funding requirements should be consistent with each office's responsibilities, current participation in the program activities, and with the Program Office and field office responsibilities described in the FRAM (DOE M 411.1-1).
- Submitting recommended activities and funding levels to the Responsible Manager.
- Interfacing with other DOE nuclear material programs, such as NMI, SNF, 94-1, and Reindustrialization.

3.2 Long-Term Organization

As the Program matures, the current organizational structure (see Figure 3-1) will evolve to reflect Programmatic and Policy decisions to be addressed in the ROD and the subsequent long-term storage and disposition strategies. Any such evolutions will be subject to CM processes and implemented only on the agreement of affected organizations.

4 PROGRAM EXECUTION

The mission of the ^{233}U Safe Storage Program is three-fold: (1) stabilize and maintain existing inventories of ^{233}U material in a safe state, and (2) bring those materials within the scope of the Program into compliance with the SRD and DOE-SAFT-0067 and (3) store them in a standard-compliant state, in accordance with the ROD. This Section identifies those activities currently planned to achieve the Program mission and introduces the logic by which Program activities will be carried out. Sections 4.2 through 4.4 correspond to WBS elements 1.1.2, 1.1.3, and 1.1.1, respectively, and provide summary descriptions, costs, and schedule data for each associated activity. Section 4.5 addresses closure of Recommendation 97-1 following satisfactory completion of IP commitments and demonstrated institutionalization of a Program to achieve safe, long-term storage objectives. Costs for activities identified in Sections 4.2 through 4.4 are estimated only through FY 2001; out-year estimates will be added as out-year activities are identified and included in future updates of this PEP. These funding requirements (with the exception of ORNL) reflect the incremental increases required above the current operating levels. The ^{233}U Program is dependent on this underlying funding; the cost projections contained herein would be jeopardized by a change in this status.

4.1 Program Logic

Planning for the Program will be managed in accordance with four documents: this PEP, the WBS, the Master Schedule, and the PLD. The WBS is described in detail in Section 4.4. The Master Schedule and the detailed PLD, which identifies program activities and their logical relationships, are issued as stand-alone documents. Changes to these documents will be controlled by the Program's CM process.

The Schedule of Key Program Milestones shown in Figure 4-1 contains the top-level activities necessary to ensure that the program progresses in the most logical, timely, and cost-conscious sequence. In this way, backtracking to accomplish overlooked actions, re-do tasks, and place tasks on hold while awaiting the results of other related actions is kept at a minimum. As the program progresses and its tasks are more clearly defined, they will be reviewed against the detailed PLD to ensure their necessity and to examine their impact on all other phases of the program. Adjustments will then be made to the PLD, as appropriate.

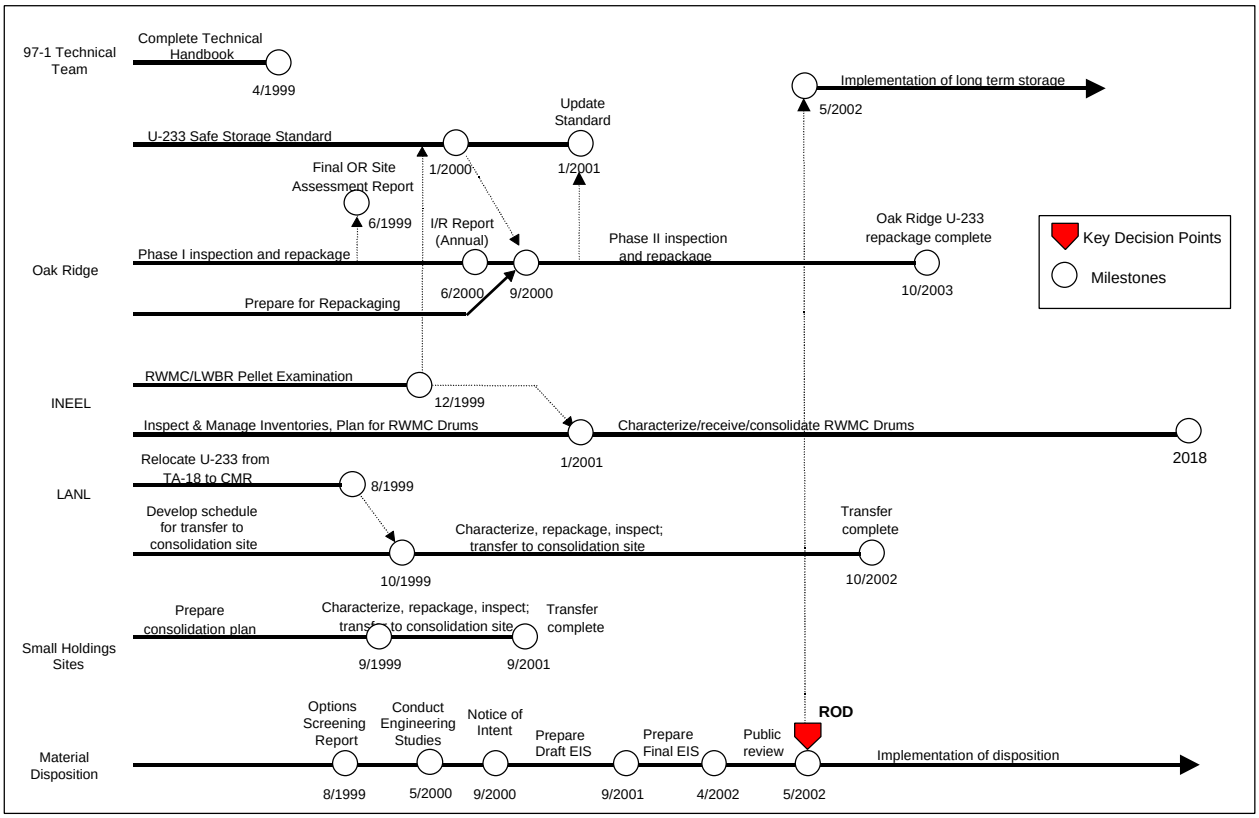


Figure 4-1. Schedule of Key Program Milestones

Milestones identified in Figure 4-1 are discussed in detail in Section 4.2 under the individual site or organization responsible for the work.

4.2 Near-term Activities and Schedules

Near-term activities are focused on stabilizing and maintaining the ^{233}U inventory through the following actions:

- Inspect inventories to characterize the physical condition of the ^{233}U inventory and utilize DOE-SAFT-0067 as initial guidance to assess the need for repackaging.
- Complete R&D and use the data to finalize the standard.
- Repackage, as necessary, to meet the final ^{233}U Safe Storage Standard.
- Maintain and upgrade, as appropriate, current primary storage facilities.
- Consolidate inventories at sites with small holdings and move material to ORNL and/or the INEEL.
- Support development of the ^{233}U Disposition EIS.

- Conduct trade studies to resolve programmatic issues.

Because of concerns related to Building 3019 at ORNL, an analysis has been completed assessing near-term storage alternatives. Although the study showed long-term benefits of relocating the inventory, DOE is considering several options before making a final decision.

4.2.1 Site Activities and Schedules

Activities for achieving near-term objectives and their associated schedules are highlighted in the sections that follow.

4.2.1.1 Idaho National Engineering and Environmental Laboratory (WBS 1.2.1). Activities and schedules for the INEEL ^{233}U inventory through FY 2001 are shown in Table 4-1, followed by a brief description of each activity.

Table 4-1. INEEL Near-term Activities and Schedules

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.2.1.1	INEEL Site Assessment and Other Actions					
1.2.1.1.1	Final Site Assessment Report (97-1 IP)	10/1998	12/1998	$25.5K	$0	$0
1.2.1.1.2	Site Assessment Updates (97-1 IP)	1/1999	12/2001	$45.3K	$45.3K	$45.3K
1.2.1.1.3	Examination of RWMC/LWBR pellets	1/1999	12/1999	$101.9K	$22.6K	$0
1.2.1.2	Manage Existing INEEL Inventory					
1.2.1.2.1	Annual Inspection of Vaults at CPP-749	1/1999	12/2001	$22.6K	$22.6K	$22.6K
1.2.1.2.2	RWMC Inspection	1/1999	12/2001	$7.5K	$7.5K	$7.5K
1.2.1.2.3	Records Management/ Reporting	1/1999	12/2001	$15.1K	$15.1K	$15.1K
1.2.1.2.4	Update SAR	10/1998	9/1999	$5K	$0	$0
1.2.1.2.5	Conduct Criticality Safety Analysis	10/1998	9/1999	$14.9K	$5K	$5K
1.2.1.3	Retrieve / Inspect / Consolidate / Repackage					
1.2.1.3.1	Plan for Characterize/ Receive/ Consolidate Retrieved Drums from RWMC Berm	1/2000	1/2001	$0	$22.6K	$83K
1.2.1.3.2	Characterize/ Receive/ Consolidate Retrieved Drums from RWMC Berm	1/2001	12/2018	$0	$0	$24.9K

1.2.1.3.3	Transfer and Store Retrieved RWMC material at CPP	1/1999	9/2001	$0	$25K	$300.9K
1.2.1.4	INEEL Support to Waste Threshold Criteria in DOE Order	10/1998	9/2001	$9.4K	$5K	$3K
1.2.1.5	INEEL Support to Safe Storage Standard	10/1998	9/2001	$9.4K	$9.4K	$9.4K
	Total INEEL			**$256.8K**	**$180.3K**	**$516.9K**

4.2.1.1.1 Final Site Assessment Report (WBS 1.2.1.1.1)— The final site assessment report for the INEEL describes storage conditions compared to the draft storage standard. The report includes a proposal to open a 6-M storage drum from the Radioactive Waste Management Complex (RWMC) inventory and inspect the Light Water Breeder Reactor (LWBR) fuel pellets and packaging materials. Future surveillance is also discussed.

4.2.1.1.2 Site Assessment Updates (WBS 1.2.1.1.2)—The results of the annual inspections of the INEEL ^{233}U storage systems will be summarized in periodic reports, as appropriate. These reports will document the status of the storage system (packages and facilities) and the stability of the ^{233}U-bearing materials.

4.2.1.1.3 Examination of RWMC/LWBR Pellets (WBS 1.2.1.1.3)—The focus of this task is to transport the inner component of the RWMC LWBR fuel pellet storage system (the 6-M drum and its internal components) to ANL-West for inspection and characterization. The examination will assess the condition of the drum and any of its components that may appear suspect, the steel tubing and its O-ring (the tubing is filled with LWBR fuel pellets), the condition of any plastic packaging material, as well as the physical status of the stability of the fuel pellets.

4.2.1.1.4 Annual CPP-749 Vault Inspection (WBS 1.2.1.2.1)—This task provides for the continued visual inspection and gas sampling of the below grade CPP-749 vaults that house the LWBR fuel. Vault gas sampling and surveys for contamination on the inner vault surfaces are used to help assess packaging integrity. Exterior surveys of the concrete vault pad are also utilized to help assess the integrity of the vault.

4.2.1.1.5 Annual RWMC Inspection (WBS 1.2.1.2.2)—This task provides for the continued contamination monitoring of the shielded overpacks that house the 6-M storage drums. Monitoring consists of collecting and analyzing smear samples around the overpacks and operating containment atmospheric monitors in the vicinity of the overpack storage location. This program will expand as additional drums of LWBR fuel material are removed from the earthen berm.

4.2.1.1.6 Records Management and Reporting (WBS 1.2.1.2.3)—This task provides the infrastructure that is required to maintain the characterization; surveillance and inspection data; related programmatic/feasibility studies; safety analysis results;

environment, safety and health (ES&H) information; etc. Funding is also required to support the communication of this information via reports and letters.

4.2.1.1.7 Update Safety Analysis Report (WBS 1.2.1.2.4)—The safety basis for the CPP-749 Dry Fuel Storage Area is currently out of date and has been operating on a basis for interim operation status. To bring the Safety Analysis Report (SAR) up to date, additional analysis is being performed that will make the SAR compliant with current orders and regulations. Completion of this project will result in an up to date SAR. The project is expected to be completed during this calendar year. Expected support is only from the subject matter experts for reviews and for data support.

4.2.1.1.8 Conduct Criticality Safety Analysis (WBS 1.2.1.2.5)—An unreviewed safety question was identified that involved the criticality cross section constants associated with ^{233}U. A bias on the order of 5% exists between the old cross-section libraries and the new cross-section libraries. To resolve this issue, verification calculations are being performed using constants that were derived at the Bettis Laboratory during their development of the LWBR. In addition to verifying the accuracy of the calculations, the models used in the calculations for the mixtures of ^{233}U and Thorium are also being verified.

4.2.1.1.9 Plan for Characterization/Receipt/Consolidation of Retrieved RWMC Drums (WBS 1.2.1.3.1)—The purpose of this task is to develop an integrated material management plan for the separated LWBR materials at CPP-749 and the RWMC. ^{233}U-bearing material that cannot be dispositioned via the Advanced Mixed Waste Treatment (AMWT) program will need to be inspected and characterized to assess its best disposition option and safe storage system requirements. Disposition options from the NMI program and ^{233}U National Environmental Policy Act (NEPA) activities will be evaluated to identify the best path forward and assess the need for consolidation of like INEEL materials to newer facilities as part of a long-term INEEL storage program. Criticality safety analyses will also be completed to assure the related tasks do not produce storage or handling configurations of fissile materials that will result in an uncontrolled criticality.

4.2.1.1.10 Characterize/Receive/Consolidate Retrieved RWMC Drums (WBS 1.2.1.3.2)— ^{233}U waste bearing material at RWMC will be retrieved via the AMWT program. Approximately 1,700 drums of ^{233}U waste bearing materials will be inspected and recovered for processing. Some of these drums (perhaps 10%) will not meet the contact handling requirements and will require additional storage until another disposition path becomes available. Thus, this material will require some additional characterization and repackaging to meet the final ^{233}U Safe Storage Standard. The AMWT program is not funded for the inspection, characterization, storage and management of this exception material. In addition there are 107 drums of LWBR fuel rods and pellets that must be segregated, inspected and placed in overpack shielded containers for storage with the 65 drums of similar material that are already housed in shielded overpack storage containers. Two of the 22 233UO2/ZrO2 drums should be inspected when they are exhumed from the TSA-RE berm. These drums are expected to be retrieved sometime after 2005. The inspection should include the examination of any

polymeric materials present in the container; condition of the drums, repackaging, and containers; and condition of the pellets.

4.2.1.1.11 Transfer and Store Retrieved RWMC Drums (WBS 1.2.1.3.3)—Once the "exception" drums with ^{233}U-bearing material have been identified, inspected and characterized they will need to be transferred to a safe storage system to await additional processing and/or disposal.

4.2.1.1.12 Support to Waste Threshold Criteria (WBS 1.2.1.4)—A waste threshold criteria has been proposed that defines three categories of ^{233}U materials that are in the existing DOE inventory. Resolution of some of the issues associated with these categories is essential to defining the disposition paths for the ^{233}U materials. These issues and others will be examined to further define the practical and workable waste threshold.

4.2.1.1.13 Support to Safe Storage Standard Updates (WBS 1.2.1.5)—The Safe Storage Standard requires resolution of some technical issues surrounding the fate of polymeric materials that are in contact with unclad materials and some other technical issues associated with materials of construction and aging of these materials. This type of support for some of these issues is required during this year.

4.2.1.2 Oak Ridge National Laboratory (WBS 1.2.2). Activities and schedules for the ORNL ^{233}U inventory through FY 2001 are shown in Table 4-2, followed by a brief description of each activity.

Table 4-2. ORNL Near-term Activities and Schedules

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.2.2.1	ORNL Site Assessment					
1.2.2.1.1	Compile Final Site Assessment Report (97-1 IP)	10/1998	6/1999	$180K	$0	$0
1.2.2.2	Manage Existing ORNL Inventory					
1.2.2.2.1	Facility Operation, Surveillance, and Maintenance	On-going	On-going	$5,037K	$5,145K	$5,299K
1.2.2.2.2	Assess Ventilation System	10/1998	5/1999	$54K	$0	$0
1.2.2.3	Inspect / Repackage					
1.2.2.3.1	Develop Inventory Inspection Plan	10/1998	4/1999	$54K	$0	$0
1.2.2.3.2	Prepare for Inspection and Repackaging Operations	10/1997	9/2000	$4,683K	$1,360K	$0

1.2.2.3.3	Inspection and Repackaging Operations - Phase 1	8/1999	9/2000	$964K	$3,125K	$0
1.2.2.3.4	Inspection and Repackaging Operations - Phase 2	10/2000	10/2003	$0	$0	$6,215K
1.2.2.4	P-24 Stabilization					
1.2.2.4.1	Develop P-24 Stabilization Plan and Flowsheet Testing	4/1999	3/2000	$54K	$18K	$0
1.2.2.4.2	P-24 Tank Stabilization	4/2000	9/2002	$0	$750K	$750K
1.2.2.5	Consolidate ^{233}U from Other Site Holdings	10/1998	9/2000	$81K	$0	$0
1.2.2.6	Facility Upgrades					
1.2.2.6.1	Facility Upgrades Required for Inspection and Repackaging	10/1998	9/1999	$300K	$0	$0
1.2.2.6.2	Facility Upgrades for Continued Safe Storage	1/1999	9/2003	$947K	$1,825K	$2,155K
1.2.2.7	U-233 Safe Storage Standard Technical Projects	10/1998	9/2001	$397K	$146K	$27K
1.2.2.8	ORNL support to Waste Threshold criteria in DOE Order	10/1998	9/2001	$9K	$5K	$5K
	Total ORNL			**$12,760K**	**$12,374K**	**$14,451K**

4.2.1.2.1 Compile Final Site Assessment Report (WBS 1.2.2.1.1)—The IP defined specific near-term actions to be taken to assess material characterization and storage conditions and make required changes to mitigate identified interim risks. The status of these actions will be reported in the ORNL Final Site Assessment Report.

4.2.1.2.2 Facility Operation, Surveillance, and Maintenance (WBS 1.2.2.2.1)—The ongoing operations and pre-existing conditions in Building 3019 require an extensive surveillance and maintenance program. Operations focus on receiving, storing and dispensing materials containing ^{233}U. In support of this central mission, operations include developing, implementing and maintaining improved surveillance measures and improved technical management systems (e.g., training, CM, and conduct of operations and maintenance). These measures and management systems promote adherence to stringent safety standards, ensure compliance with regulations, promote timely update to authorization basis documents, and ensure a comprehensive approach to the Integrated Safety Management System.

Aging processing systems (abandoned from former operations) within the facility must be kept in a safe condition and their support systems must be maintained in reliable operating condition to protect workers and the environment. Intensive surveillance must be conducted to detect equipment deterioration that poses an increased risk of

contamination spread. Such deteriorated equipment must be dismantled or repaired in a timely manner to protect workers and the environment.

4.2.1.2.3 Assess Ventilation System (WBS 1.2.2.2.2)—The exhaust portion of the Building 3019 ventilation system functions to establish and maintain controlled airflow and pressure differential conditions for spaces throughout the building by routing airflow from occupied spaces to those not occupied. An engineering review of the existing ventilation system is being performed to determine the system baseline. The major operational objectives of the ventilation system are being defined. Documentation will then be prepared to specify the requirements for the ventilation system and define the necessary upgrades to the ventilation systems required for long-term storage.

4.2.1.2.4 Develop Inventory Inspection Plan (WBS 1.2.2.3.1)—This task will utilize data gathered from the investigation and characterization of records and the initial survey inspections. The plan will be a technical document that describes the statistical selection of packages to be inspected, the inspection methods, and inspection schedules.

4.2.1.2.5 Prepare for Inspection and Repackaging Operations (WBS 1.2.2.3.2)—Preparations for inspection and repackaging of containers in Building 3019 will provide equipment, procedures, and training to initiate operation while controlling risks to acceptable levels and maintaining radiation exposure as low as reasonably achievable (ALARA). A portable, shielded retrieval and inspection chamber will be installed above each tube vault. Non-destructive assay equipment and a digital radiography unit are being procured. Special staging vaults will minimize security costs and improve operational flexibility during inspections. Modular hot cells have been installed for repackaging. Remotely operated equipment for package closure and leak testing will be installed. Safety analysis, criticality safety analysis, procedures, and training will ensure safe operation of the inspection equipment and container handling.

4.2.1.2.6 Inspection and Repackaging Operations-Phase I (WBS 1.2.2.3.3)—Inspection and repackaging activities will be performed in two phases. In Phase I, ^{233}U containers will be inspected by non-destructive assay (NDA) and non-destructive examination (NDE). The goal of Phase I is to inspect a broad cross-section of package types.

The inspection and necessary repackaging includes accessing storage vaults, retrieving the containers from the vaults, securing the vaults, transferring the containers to a staging vault, and performing the inspections. The first inspections include a visual check, a smear for contamination, and temporary labeling performed within an enclosed inspection chamber. From the inspection chamber, the containers are transferred in a shielded cask to a shielded cell for the NDA/NDE inspections and laser etching. Results of the inspections will be documented in an annual inspection report.

4.2.1.2.7 Inspection and Repackaging Operations-Phase II (WBS 1.2.2.3.4)—Phase II involves both ^{233}U containers that require repackaging and ^{233}U -bearing material that has to be stabilized and repackaged. The container is transferred to a hot cell containing equipment for opening cans, stabilizing the ^{233}U material, sealing the cans, and a bagless

loadout system. The material will be repackaged into two nested, leak-tight, corrosion-resistant containers. After the ^{233}U-bearing material is repackaged or stabilized and repackaged, the containers are transferred to a shielded cell for baseline NDA/NDE and laser etching. Following the NDA/NDE baseline and laser etching, the containers will be returned to a staging vault or placed in a storage vault. Results of the inspections will be documented in an annual inspection report.

4.2.1.2.8 Develop P-24 Stabilization Plan and Flowsheet Testing (WBS 1.2.2.4.1)— Tank P-24 currently contains ~16,000 L of thorium nitrate solution slightly contaminated with ^{233}U in a nominal 10,000-gal tank located below ground level in a ventilated bunker adjacent to Building 3019. The stabilization plan will identify and evaluate alternatives for converting the aqueous salt solutions to a safe solid for long-term storage and disposition. Once a preferred alternative for stabilization is selected, a process flowsheet will be tested at bench-scale to confirm the process.

4.2.1.2.9 P-24 Tank Stabilization (WBS 1.2.2.4.2)—Pending successful completion of the aforementioned process flowsheet selection and testing, the thorium nitrate solution will be stabilized.

4.2.1.2.10 Consolidate ^{233}U from Other Sites (WBS 1.2.2.5)—The consolidation of minor holdings of ^{233}U from other sites will involve receipt of the ^{233}U at Building 3019, storage, and tracking of the inventory. Other activities related to consolidation are addressed in Sections 4.2.1.3 and 4.2.1.4.

4.2.1.2.11 Facility Upgrades Required for Inspection and Repackaging (WBS 1.2.2.6.1)—The existing Glove Box Off-Gas (GBOG) system requires upgrading to provide for repackaging operations in the hot cells. Upgrading includes installation of new two-stage HEPA filters located within secondary confinement. The installation phase of the GBOG Up-Grade Project is complete. The project is now in the tie-in and system re-balancing phases. These upgrades must be completed before the start of Phase II inspections.

4.2.1.2.12 Facility Upgrades for Continued Safe Storage (WBS 1.2.2.6.2)—Tube vault modifications will be made to provide extra storage volume for repackaged material and to improve flexibility in segregating and accessing re-stored materials.

A series of upgrades are being planned based on the results of the Ventilation System Assessment described in Section 4.2.1.2.3. These upgrades ensure that the ORNL Building 3019 Ventilation System provides confinement of ^{233}U while preventing the spread of airborne contamination under postulated accidents and other credible events.

Potential facility structural maintenance and support systems modifications are planned to reduce or eliminate operational limitations that are identified as a result of the natural phenomenon hazards analysis that is being completed for Building 3019. Thus far, evaluation of storage tube vaults housing the ^{233}U inventory has been completed and demonstrates that the wells meet Performance Category 3 criteria for Natural Phenomena Hazards (DOE-STD-1020-94, Ch. 1).

4.2.1.2.13 ^{233}U Safe Storage Standard Technical Projects (WBS 1.2.2.7)—This task includes studies for technical refinement and revision of the final ^{233}U Safe Storage Standard. The Technical Basis document addressing comment resolution was issued at the end of February 1999. A quarterly report will be issued the end of March 1999, and the final Standard will be issued January 2000. Revisions to the Standard will be based on the results of literature reviews, experimental studies, and Phase I and Phase II inspection and repackaging operations. The ongoing literature review will concentrate on radiation effects on oxides, oxyhalides, sorbed water, and on chemical stability under irradiation. The experiments will address water sorption, radiolysis, and hydrofluoric corrosion. This task will also update the Standard with developments in new acceptable material forms, storage policies, monitoring capabilities, NDA, and other technology changes that could impact the long-term storage program for these materials.

4.2.1.2.14 Support to Waste Threshold Criteria (WBS 1.2.2.8)—A waste threshold criteria has been proposed that defines three categories of ^{233}U materials that are in the existing DOE inventory. Resolution of some of the issues associated with these categories is essential to defining the disposition paths for the ^{233}U materials. These issues and others will be examined to further define the practical and workable waste threshold.

4.2.1.3 Los Alamos National Laboratory (WBS 1.2.3). Activities and schedules for the LANL ^{233}U inventory through FY 2001 are shown in Table 4-3, followed by a brief description of each respective activity.

Table 4-3. LANL Near-term Activities and Schedules

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.2.3.1	LANL Site Assessment	9/1998	12/1998	$15K	$0	$0
1.2.3.2	Manage Existing LANL Inventory	10/1998	10/2002	$20K	$20K	$0K
1.2.3.3	Relocate Inventory	1/1999	10/2002	$25K	$330K	$0K
	Total LANL			**$60K**	**$350K**	**$0K**

4.2.1.3.1 LANL Site Assessment (WBS 1.2.3.1)—The Final Site Assessment documents plans for safe storage of ^{233}U and shipment of excess inventories to ORNL.

4.2.1.3.2 Manage Existing LANL Inventory (WBS 1.2.3.2)—This task involves management oversight of the project and monitoring the progress and final disposition of the sites and materials involved.

4.2.1.3.3 Relocate Inventory (WBS 1.2.3.3)—LANL will execute an intra-site move of selected portions of the LANL ^{233}U inventory to the Chemical and Metallurgical Research (CMR) facility. The identified items are no longer need for programmatic

activities and are targeted for transfer to ORNL. Following intra-site transfers, a detailed packaging and shipping schedule will be developed for each container of excess ^{233}U materials. The materials will subsequently be moved to ORNL. This task will include any stabilization for shipment, repackaging to ORNL acceptance criteria, packaging in certified shipping containers, and shipment of the material to ORNL.

4.2.1.4 DOE Sites with Small Holdings of ^{233}U (WBS 1.2.4). Activities and schedules for sites with small holdings through FY 2001 are shown in Table 4-4, followed by a brief description of each respective activity. The objective of this effort is to consolidate inventories at sites with small holdings to ORNL and/or the INEEL. Some site-specific support may not be included in the funding estimates represented in Table 4-4. These tasks are managed by LLNL and include consolidation of the LLNL inventory. Funding for these activities will be provided by the material owner organization, namely the Office of Nuclear Energy, Science, and Technology (NE); Office of Energy Research (ER), now called the Office of Science (SC); or DP, as described in Section 5, Tables 5-1 and 5-2.

Table 4-4. Near-term Activities and Schedules for Sites with Small Holdings

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY-2001
1.2.4.1	Small Holdings Site Assessments					
1.2.4.1.1	Issue Small-Holdings Sites Assessment	6/1998	1/1999	$10K	$0	$0
1.2.4.2	Manage Existing Small Holding Site Inventories					
1.2.4.2.1	Project Management	10/1998	9/2000	$10K	$10K	$31K
1.2.4.3	Relocate Inventory					
1.2.4.3.1	Prepare Consolidation Plan	10/1998	9/1999	$10K	$80K	$0
1.2.4.3.2	Coordinate Intersite Consolidation	10/1998	9/2000	$0	$60K	$31K
1.2.4.3.3	Support Packaging and Transportation of Materials	1/1999	9/2000	$45K	$85K	$31K
	Total for Sites with Small Holdings			**$75K**	**$235K**	**$93K**

4.2.1.4.1 Issue Small-holdings Sites Assessment (WBS 1.2.4.1.1)—Item level assessment of these ^{233}U materials and their issues are needed to adequately determine conditions for consolidation at the appropriate storage site or creating a pathway in other disposal streams. The initial list of 22 sites has been reduced to 13 in-scope sites. Actions to resolve five of these remaining in-scope sites were initiated in FY 1998. Eight sites require further assessment of the material condition and retention.

4.2.1.4.2 Project Management (WBS 1.2.4.2.1)—This task involves project oversight and monitoring the progress and final disposition of the sites and materials involved.

4.2.1.4.3 Prepare Consolidation Plans (WBS 1.2.4.3.1)—This task involves preparing plans and shipper-receiver agreements to reflect activities associated with the consolidation of surplus ^{233}U at sites with small holdings that are within the scope of the Safe Storage Program. Where feasible and appropriate, small sites may elect to ship small quantities directly to disposal sites or hold the material until a disposition alternative is available.

4.2.1.4.4 Coordinate Intersite Consolidation (WBS 1.2.4.3.2)—This task involves the actions necessary to provide the interface between the shipper and receiver sites involved in consolidation or disposal. The work addresses item-level issues determined by the site assessment, and culminates in shipping or disposing ^{233}U materials.

4.2.1.4.5 Support Packaging and Transportation of Materials (WBS 1.2.4.3.3)—This task involves providing hands-on shipping/packaging expertise at individual sites, as required, for preparing their materials for shipment to consolidation sites.

4.2.2 ^{233}U Disposition Activities and Schedules (WBS 1.2.5)

Key MD ^{233}U program activities and schedules through FY 2001 are shown in Table 4-5, followed by a brief description of each respective activity or milestone.

Table 4-5. Fissile Material Disposition Near-term Activities

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.2.5.1	MD NEPA Support			$0K	$100K	$4,500K
1.2.5.1.1	Select Options	9/1998	8/1999			
1.2.5.1.2	Engineering Studies	8/1999	5/2000			
1.2.5.1.3	Notice of Intent	5/2000	9/2000			
1.2.5.1.4	Draft EIS	9/2000	9/2001			
1.2.5.1.5	Final EIS	9/2001	4/2002			
1.2.5.1.6	ROD	4/2002	5/2002			
1.2.5.2	ORNL Support	9/1998	10/2001	$500K	$1,500K	$1,500K
1.2.5.3	INEEL Support	9/1998	10/2001	$120K	$500K	$500K
1.2.5.4	SRS Support	9/1998	10/2001	$160K	$900K	$700K
	Total Fissile Materials Disposition			**$780K**	**$3,000K**	**$7,200K**

4.2.2.1 MD NEPA Support (WBS 1.2.5.1). Several decisions that could be subject to NEPA compliance requirements include disposal, modified or new long-term storage facilities, and relocation of materials to ORNL to meet near-term objectives. MD will have the primary responsibility for development of the EIS and will coordinate with EM, DP, NE, and other

organizations affected by the decision. NEPA activities include the programmatic support needed to collect generate, and analyze site-specific data that will help develop the ^{233}U Disposition EIS and its ROD.

4.2.2.1.1 Select Options (WBS 1.2.5.1.1)—This activity prepares a screening report that lists all reasonable ^{233}U disposition options and selects the most logical options which are to be considered and evaluated further during the EIS process.

4.2.2.1.2 Engineering Studies (WBS 1.2.5.1.2)—This activity will conduct engineering studies that will provide a preliminary quantitative assessment of the ^{233}U disposition options.

4.2.2.1.3 Notice of Intent (WBS 1.2.5.1.3)—This activity publishes a public DOE Notice of Intent (NOI) to prepare an EIS for the disposition of ^{233}U material and identifies the parameters against which the evaluation will be conducted.

4.2.2.1.4 Draft EIS (WBS 1.2.5.1.4)—DOE publishes the draft EIS that provides the public with the results of DOE's evaluation of ^{233}U disposition options. Publishing the draft EIS requires each site to respond to an EIS data call. The data call provides site-specific environmental impact data for each of the proposed management/disposition options under consideration. The net result of this effort allows the public to comment on the draft document and to participate in the decision process for the disposition of the material.

4.2.2.1.5 Final EIS (WBS 1.2.5.1.5)—DOE issues the final EIS that incorporates the input from public comments on the draft EIS and final site-specific impact data. The final EIS defines the environmental impact of the proposed actions of the NOI.

4.2.2.1.6 Record of Decision (1.2.5.1.6)—The ROD will determine the amount of material for disposition, the amount to remain in long-term storage for programmatic use, the method of disposition, and the location for the long-term storage of the material remaining in programmatic use.

4.2.2.2 Site Support (ORNL, INEEL, and SRS) of the ^{233}U Disposition EIS (WBS 1.2.5.2, 1.2.5.3, and 1.2.5.4). This activity includes the efforts of the various sites to provide data to the MD NEPA process to evaluate and analyze disposition options. The site activities include developing input to studies of various disposition options and providing environmental data to be evaluated in the EIS process.

4.3 Long-term Activities

Long-term actions encompass activities necessary to support the implementation of a solution to bring materials that are within Program scope into compliance with the SRD and final ^{233}U Safe Storage Standard and safely store them for period of not less than 50 years, and (2) any other actions necessary to implement the ROD. Major activities associated with the long-term phase of the Program begin with the completion of the ROD and development of the System Design

Description (SDD). The SDD will describe in detail the facilities and associated capabilities required to accomplish the long-term storage program identified in the ROD.

4.3.1 Key Activities

Program activities scheduled to begin beyond FY 2001 correspond to WBS element 1.3.1 (see Figure 4-2) and will implement a disciplined systems engineering process for responding to ROD recommendations. The activities will be further defined and costed as part of future planning efforts, consistent with the ROD.

4.3.2 Long-term Issues

Long-term storage issues impacting the ^{233}U Safe Storage Program include:

- Consideration of ^{233}U as a national resource.

- Consideration of ^{233}U for potential beneficial uses. For example, considerable research has been conducted over the past decade in alpha-radioimmunotherapy, specifically in area of antitumor antibodies radiolabeled with an alpha-emitter. Continued need for this decay product must be accommodated in long-term storage strategies.

- Official determination of limits for safeguards termination.

- Formalization of waste threshold criteria.

- Declaration of weapons usability for ^{233}U. Current laws and regulations do not recognize isotopic blending of ^{233}U as a method of conversion into a non-weapons-usable material. Calculations indicate an isotopic dilution limit of approximately 12 wt% ^{233}U for weapons safeguards. Assuming that the balance of the material is ^{238}U, 12 wt% ^{233}U is roughly equivalent to 20 wt% ^{235}U.

- Meeting waste acceptance criteria for a national repository.

- Availability of facilities for long-term storage. For example, if new SNF storage facilities become available at the INEEL due to moving SNF to a suitable waste repository, some of the ^{233}U inventory may be transferred at that time, if justified by cost and risk reductions. Similarly, consolidation of alpha materials at ORNL may provide location for storage of the ^{233}U inventory.

- Timely integration with other related disposal programs.

The Technical Team will continue to address these issues as part of its on-going charter and include any subsequent issues and activities as part of future PEP updates.

4.4 Program Support Activities and Schedules (WBS 1.1)

The Program uses a systems approach that ensures product and program performance (quality, cost, and schedule) by establishing clear and appropriate accountability for specific activities. The approach is based on a decomposition of system requirements, supported by trade studies to establish the basis for significant decisions. Section 4.4 consists of four major subsections: Systems Engineering, Program Management, Quality Assurance (QA), and Technical Support. These subsections identify the top-level activities to be conducted in managing the Program. Subtasks for each top-level activity are listed in the cost summary table is Section 5.

4.4.1 Systems Engineering Activities and Schedules (WBS 1.1.1)

The following Systems Engineering activities and schedules have been identified in support of the Program. A more detailed description of the Systems Engineering process is provided in the *Systems Engineering Management Plan* (SEMP) *for the ^{233}U Safe Storage Program*:

Table 4-6. Systems Engineering Activities and Schedules

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.1.1.1	Systems Planning	10/1997	On-going	$62.2K	$17.1K	$17.1K
1.1.1.2	Requirements Analysis	10/1997	On-going	$24.7K	$202K	$204K
1.1.1.3	Functional Analysis	10/2001	On-going	$0	$0K	$0K
1.1.1.4	Synthesis	6/1999	12/2003	$49.6K	$118.7K	$0K
1.1.1.5	Validation and Verification	10/2001	On-going	$0	$0	$0K
1.1.1.6	Systems Analysis and Trades	1/1999	On-going	$111.2K	$723.8K	$909.9K
1.1.1.7	Technical Design Reviews	12/2002	On-going	$0	$0	$0
1.1.1.8	System Integration	5/1999	On-going	$3.8K	$51.1K	$190K
	Total Systems Engineering			**$251.4K**	**$1,112.7K**	**$1,320.8K**

Breakdowns by site and funding source for Systems Engineering cost estimates appear in the Section 5.1.

4.4.1.1 System Planning (WBS 1.1.1.1). System planning will provide the foundation on which all engineering will be performed. In the case of Systems Engineering it will specify the SE activities, timing, sequence, and authority of the various SE staff and organization. The SEMP is being prepared in parallel with the PEP.

4.4.1.2 Requirements Analysis (WBS 1.1.1.2). Completion of the ^{233}U Safe Storage Standard, Criteria for Packaging and Storing Uranium-233-Bearing Material (DOE-SAFT-0067) was a specific commitment of the 97-1 Implementation Plan and is a key component of the system requirements for the ^{233}U Safe Storage Program as specified in the System Requirements

Document. An interim Standard was issued in December 1998 for use until the final Standard is released. The Technical Team will support the development of the final version of the above standard which will be issued January 2000. Specific INEEL and ORNL support and funding for the Standard development are addressed under their respective site activities described in Section 4.2. Once finalized by the ^{233}U Safe Storage Team, the DOE Technical Standards Program will manage the formal standard review process, issue, and maintain the Standard. Defense Programs (DP) is the official sponsor for this standard and will initiate this process.

This task also includes systems engineering team activities to maintain and update the SRD and generate subsystem requirements and specifications, including development and maintenance of the TBD/TBR Resolution Plan

4.4.1.3 Functional Analysis (WBS 1.1.1.3). Performance and design requirements will be allocated to each system function and sub-function in sufficient detail to permit further allocation to hardware, software, procedural data, or personnel. Traceability of the allocated requirements will be maintained.

4.4.1.4 Synthesis (WBS 1.1.1.4). The synthesis phase of the system design process will integrate trade study results with the strategy endorsed by the NMI program to formulate a long-term strategy. The system concept will evolve from CDD that accompanies this PEP in step with the NEPA process, culminating in an SDD for the Safe Storage System following issuance of the ROD.

4.4.1.5 Validation and Verification (WBS 1.1.1.5). Verifying the capability of the Safe Storage System to satisfy system requirements and accomplish its mission will require system and subsystem level testing throughout the system life cycle. The following two activities will be necessary:

- Development and implementation of a Verification Plan
- Development and implementation of a Test and Evaluation Plan.

4.4.1.6 System Analysis and Trades (WBS 1.1.1.6). Systems analysis focuses on defining and conducting trade studies and risk analysis associated with the system. For the ^{233}U Safe Storage Program, three systems analysis activities have been defined:

1. Establishing Trade Study Guidelines
2. Conducting Trade Studies
3. Conducting Risk Analyses

Activities 2 and 3 are described in further detail in the *Trade Study Guidelines for the ^{233}U Safe Storage Program* and in the forthcoming *Risk Management Plan*, respectively. The following trade studies have been identified to date:

- Long-term Storage Trade Studies. These studies will evaluate different options for safely storing the ^{233}U inventory in compliance with DOE-SAFT-0067 for a period of not less than 50 years. Initially, these trade studies will provide a basis for determining the quantities of

^{233}U to be directed to each potential storage or disposition path. Once this decision is made, lower-level trades regarding storage location, enrichment dilution, and so forth can be addressed to further narrow potential paths to a limited number of viable storage solutions.

The Technical Team will continue to identify supporting trade studies as part of its on-going charter and include them as part of future PEP updates. Supporting trade studies will be conducted as they are identified throughout the systems analysis process to assess alternative solutions for the storage and disposition of the ^{233}U inventory.

4.4.1.7 Technical Design Reviews (WBS 1.1.1.7). As specified in the SEMP, the following technical reviews will be conducted in support of the overall Program to ensure that the design organizations produce products that fully meet the SRD requirements*:*

- System Requirements Review (WBS 1.1.1.7.1). This review is complete and was held upon completion of the SRD

- System Design Review (WBS 1.1.1.7.2). This review will be held upon completion of the CDD and SDD

- Preliminary Design Review (WBS 1.1.1.7.3). The review will be held upon completion of Project Preliminary Design to ascertain if the preliminary design is to be committed to detailed design.

- Critical Design Review (WBS 1.1.1.7.4). This review will be held upon completion of Project Detailed Designs. The result of successfully completing this review should be the release of the detailed design documentation for manufacturing and/or construction.

- Operational Readiness Review (WBS 1.1.1.7.5). This review is held at project completion to support turn over of the system

These reviews are described in detail in the SEMP.

4.4.1.8 System Integration (WBS 1.1.1.8). Systems integration will ensure that each level of hardware and software meets its specified requirements and all sub-systems work together. A more detailed description is provided in the SEMP.

4.4.2 Program Management Activities and Schedules (WBS 1.1.2)

The activities and schedules required to effectively manage the ^{233}U Safe Storage Program are described in the following sections.

Table 4-7. Program Management Activities and Schedules

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.1.2.1	Funds Management/ Monitoring	1/1999	On-going	$15.1K	$15.1K	$15.1K
1.1.2.2	Program Planning	1/1999	On-going	$356.6K	$96.7K	$193.1K
1.1.2.3	Program Baseline	1/1999	On-going	$77.5K	$62.4K	$62.4K
1.1.2.4	Performance Measures	1/1999	On-going	$7.6K	$9K	$22.7K
1.1.2.5	Program Reporting/ Coordination	1/1999	On-going	$416.9K	$313.9K	$379.8K
1.1.2.6	Configuration Management	1/1999	On-going	$38.2K	$97.1K	$170.6K
1.1.2.7	Contracts Management	1/2002	On-going	$0	$0	$0
1.1.2.8	Risk Management	1/2000	On-going	$0	$45.3K	$79.5K
1.1.2.9	Regulatory Compliance	1/2002	On-going	$0	$0	$0
1.1.2.10	Skills Maintenance	1/1999	On-going	$254.3K	$157.7K	$225.6K
	Total Program Management			**$1,166.2K**	**$797.3K**	**$1,148.8K**

Breakdowns by site and funding source for Program Management cost estimates appear in the Section 5.1.

4.4.2.1 Funds Management/Monitoring (WBS 1.1.2.1). EM has the lead responsibility and the Program Office will reside in EM, but funding will be provided by EM, DP, MD, NE, and SC. This occurs due to the past ownership of the facilities and materials by DP and the designated responsibility of MD for disposition of designated nuclear materials, thereby requiring a coordinated effort to fund the planning and execution of the Program.
Prior to the start of the annual field budget process (i.e., November or December), the Technical Team will prioritize the Program activities from the commitments in the 97-1 IP and activities described in the PEP. In prioritizing these activities, the Technical Team will consider inputs from the affected program offices and from personnel at sites involved in the storage, handling, transportation, and disposition of ^{233}U material.

Once the list of prioritized activities is developed, the Technical Team will recommend the appropriate activities and corresponding funding levels to the Responsible Manager. The funding levels should be based on inputs from program office and field management, and from the previous year's funding levels, to be adjusted for any planned changes to the scope of work. The funding levels may have to be further reviewed by the Technical Team if unexpected funding cuts result from congressional appropriations.

The responsible program organizations will, to the extent practicable, continue to fund those Program activities for which they are currently responsible. Changes in type and location of program activities must also be considered. To the extent possible, the Technical Team should specify the recommended funding requirements by site and program office to help in the budget formulation process.

The Responsible Manager will review the Program activities recommended by the Technical Team and ensure that the activities are consistent with the 97-1 IP and the PEP. The Responsible Manager will formally transmit a description of the Program activities and corresponding funding levels to the primary Secretarial Officers (EM-1, DP-1, MD-1, NE-1, and SC-1) and the Chief Financial Officer for inclusion in the initial funding targets for the budget formulation process.

Upon receipt of the activity and funding requirements from the Responsible Manager, the affected program offices will take the actions necessary to ensure that these are included in their budget formulation, including coordination with the appropriate operations, field, and area offices. The program offices will ensure that Program activities are uniquely described at the project level within their budget justification narratives, along with milestones and performance measures, as appropriate. Descriptions of Program activities and associated funding will be identified in clearly delineated terms (i.e., stand-alone and not described as one of several related activities). The Chief Financial Officer will monitor program offices to verify that all required Program activities are uniquely delineated within the budget justification narratives.

Deviations from the activity descriptions and funding levels that were provided by the Responsible Manager will be promptly reported by the program offices to the Responsible Manager. If the Responsible Manager judges the deviations to be significant (i.e., commitments in the 97-1 IP or PEP are at risk), the Responsible Manager will report such deviations to the Assistant Secretary for Environmental Management. The Assistant Secretary for Environmental Management should report significant budget shortfalls or deviations in budget execution plans to the Deputy Secretary, and request assistance from the Chief Financial Officer to resolve budget shortfalls.

4.4.2.2 Program Planning (WBS 1.1.2.2). Program planning includes work planning, development of plans that govern the operation of the program, Program Baselines, performance measurement, reporting, CM, contracts management, risk management, regulatory compliance, and skills maintenance.

> ***4.4.2.2.1 Work Planning (WBS 1.1.2.2.1)—*** The two major components of work planning are the WBS and WBS Dictionary.
>
> - Work Breakdown Structure (WBS 1.1.2.2.1.1). Program work will be subdivided into the basic units shown in Figure 4-2. As the program progresses, these units will be further decomposed into manageable units called Cost Accounts, which provide the management control points for scope, schedule, and cost.
>
> - WBS Dictionary (WBS 1.1.2.2.1.2). A WBS dictionary describes the work scope for each WBS element to include the WBS number, title, and detailed work description. The WBS Dictionary will be developed during FY 1999.
>
> The WBS and WBS dictionary will be updated to reflect Change Control Board-approved changes (see Section 4.4.2.6) as needed throughout the life of the Program.

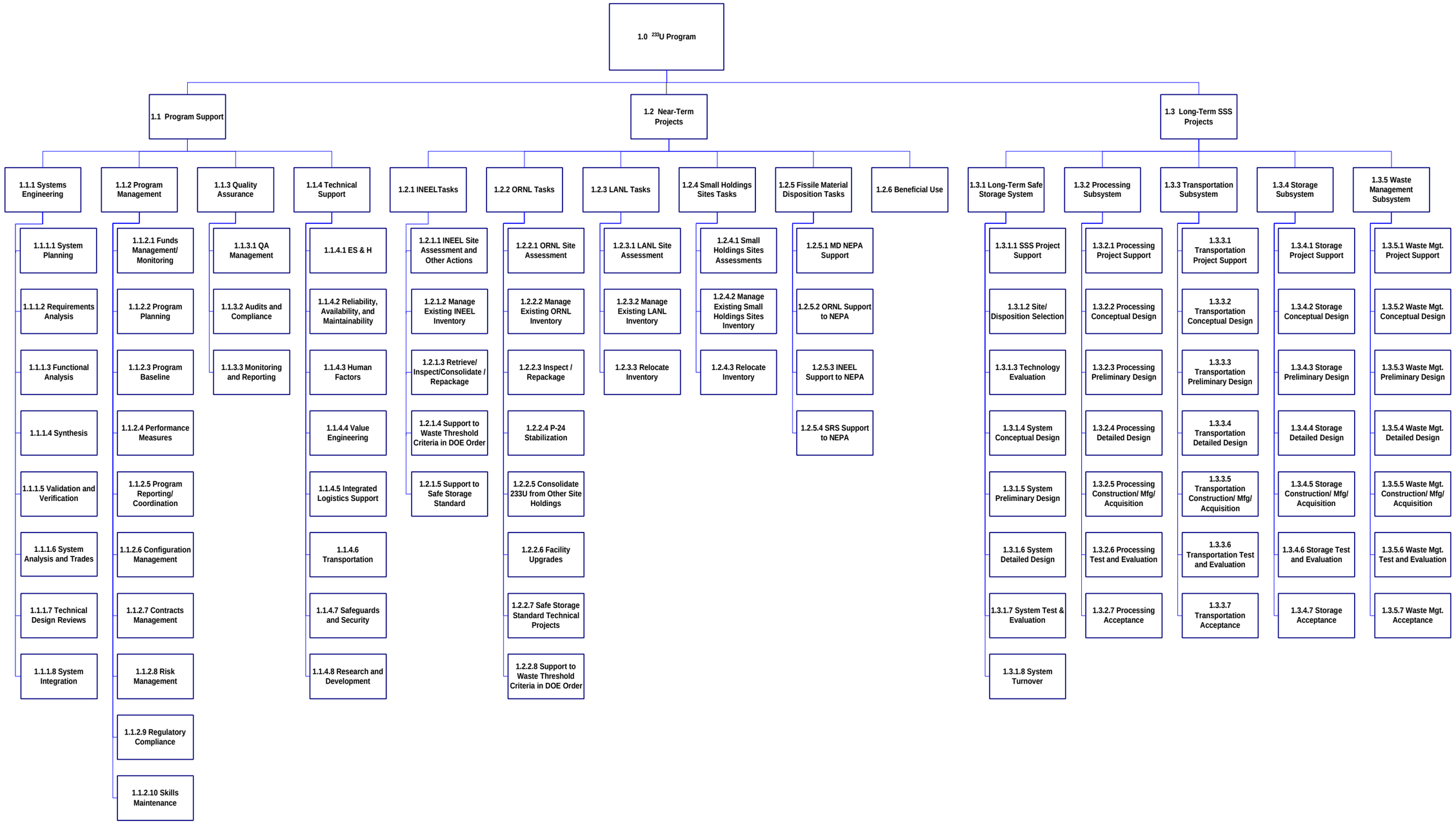


Figure 4-2. ^{233}U Program Work Breakdown Structure

4.4.2.2.2 Program Plans (WBS 1.1.2.2.2)—A series of planning documents will be prepared to provide the technical team and program management with a defined foundation upon which to build a solution. These plans include:

- Planning Assumptions (WBS 1.1.2.2.2.2)
- Program Execution Plan (WBS 1.1.2.2.2.3)
- Program Logic Diagram (WBS 1.1.2.2.2.4)
- Program Life Cycle Model (WBS 1.1.2.2.2.5)
- Long Term Strategy (WBS 1.1.2.2.2.6)
- Decontamination and Decommissioning Plan (WBS 1.1.2.2.2.7)

Program plans will be updated, as necessary, to reflect evolutions in Program scope and to address specific long-term storage issues. The PEP will be updated annually—based on inspection results, strategic development, and new technical information—to correspond with the DOE budget process.

4.4.2.3 Program Baselines (WBS 1.1.2.3). Program Baselines involve tracking schedule, cost, and technical performance against targets and controlling activities to achieve those targets. The following subsections provide an overview of the planned Program Baseline activities.

4.4.2.3.1 Program Schedule Baseline (WBS 1.1.2.3.2)—The schedule baseline will consist of a Program Master Schedule, an Integrated Program Schedule, and Detailed Schedules. Milestones will link the activities between schedules. A brief description of each schedule in the Program Schedule Baseline follows:

- The Program Master Schedule. The Program Master Schedule will track the highest level of milestones in the baseline based on an analysis and determination of mission and program requirements and external constraints. All requirements and constraints—including key decisions, delivery requirements, regulatory milestones, or other commitments—are identified and planned for.

- The Integrated Program Schedule. The Integrated Program Schedule is the primary schedule from which schedule performance will be managed, measured, and reported.

- Detailed Schedules. Detailed Schedules will be used by contractor cost account managers, functional managers, and subcontractors to plan and control work scopes under their cognizance and coordinate them with the Integrated Program Schedule.

4.4.2.3.2 Program Cost Baseline (WBS 1.1.2.3.1)—The cost baseline will be based on estimates developed using inputs from the Technical Team and program support organizations and in accordance with DOE O 430.1, *Life Cycle Asset Management*, and its associated guides. This baseline will factor in approved escalation rates. Program contingency will be included as a separate part of the cost baseline.

4.4.2.3.3 Program Control Strategy (WBS 1.1.2.3.3)—Complete traceability will be ensured between the program work, schedule baseline, and cost baseline using the WBS

and WBS dictionary as a framework for organization. A Program Control Strategy will be developed and implemented to facilitate this effort.

4.4.2.4 Performance Measures (WBS 1.1.2.4). Technical Performance Measures (TPM) provide visibility of actual versus planned performance and early detection of problems that may require management attention. TPMs will be based on a review of program performance requirements as specified in the SRD, the WBS, and other system documentation detailing critical performance parameters.

4.4.2.5 Program Reporting/Coordination (WBS 1.1.2.5). Each project will report deviations from the plans and baselines on a quarterly basis. To facilitate reporting, three types of reviews (periodic, technical, and event-driven) will be conducted at appropriate points in the Program life cycle. GPG-FM-006, *Performance Analysis and Reporting Guide for use with DOE O 430.1*, will be used to develop reporting procedures and formats for the Program. Results of project reports will be analyzed for new or evolving risks. Identified risks will be monitored, and their status and mitigation efforts will be reported.
The coordination portion of this activity includes establishing and maintaining interfaces with related programs, namely, NMI, 94-1, MSRE remediation, fissile materials disposition, and medical isotopes programs,

4.4.2.6 Configuration Management (WBS 1.1.2.6). The ^{233}U CM process consists of configuration change control via a Change Control Board, configuration status accounting, and configuration verification, as described in the CMP.

4.4.2.7 Contracts Management (WBS 1.1.2.7). The Program may utilize both independent contractors and DOE Management & Operating (or Management & Integrating) contractors at the affected sites, as specified in the Statements of Work for individual projects. A Contracts Management Plan will be developed to ensure consistent and effective use of independent contractors if and when they are used.

4.4.2.8 Risk Management (WBS 1.1.2.8). The Program will establish a risk management (RM) process, in accordance with DOE O 430.1 and its associated Risk Management Guide. The process will include continuous, accurate risk identification and assessment; risk mitigation; and risk tracking and reporting to ensure balance between affordability, schedule, operability, quality and performance. A Risk Management Plan will be prepared to fully define this process.

4.4.2.9 Regulatory Compliance (WBS 1.1.2.9). The Program will establish a Regulatory Compliance Plan to address implementation of DOE Orders and federal and state laws and regulations concerning the environment, safety and health issues associated with Program activities. This plan will be established prior to implementation of the long-term Safe Storage System. This plan will also incorporate the technical support activities described in Section 4.4.4.1.

4.4.2.10 Skills Maintenance (WBS 1.1.2.10). The involvement of highly qualified and experienced retirees over the next few years will be maintained to ensure that technology related to ^{233}U is transferred to the next generation of workers. Experience and knowledge in handling

and processing other high-specific-activity alpha emitters is also relevant for the continued safe storage of ^{233}U. Critical expertise will be maintained by involving personnel in similar actinide processing and handling, augmented by training and a *Technical Handbook of ^{233}U Material Properties, Processing and Handling Guidelines (ORNL/TM-13600).*

4.4.2.10.1 Resource Management (WBS 1.1.2.10.1)—A staffing plan will be developed based on the estimated level of technical personnel resources in skill areas required to maintain a viable safe storage and repackaging program. The availability of retirees to provide ^{233}U-related expertise will also be included in the plan. The skill areas to be used will be those identified in *Technical Competencies for the Safe Interim Storage and Management of ^{233}U at Department of Energy Facilities* (ORNL/TM-13579). This information will be made available to sites requiring ^{233}U expertise.

4.4.2.10.2 Maintain Skills (WBS 1.1.2.10.2)—A formal training plan will be developed to address personnel training and qualification issues critical to the long-term goal of maintaining technical competency in accordance with DOE 5480.20A. Additionally, A handbook for technical and operational information; processing history and background; and known radiological, criticality, and chemical properties of ^{233}U /^{232}U is being compiled as part of the technical competency effort. This handbook will emphasize lessons learned and radiological behaviors.

4.4.3 Quality Assurance Activities and Schedules (WBS 1.1.3)

A QA Program will be established to manage the objectives and controls to be applied during the various phases of Program work and to provide confidence that the Program meets predetermined requirements and will perform satisfactorily.

A QA Plan that complies with 10 CFR 830.120 and DOE 5700.6C will be developed to ensure quality in all work processes, products, and services, and to support continuous quality improvement.

Table 4-8. Quality Assurance Activities and Schedules

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.1.3.1	QA Management	7/2001	On-going	$0	$0	$30.2K
1.1.3.2	Audits and Compliance	1/2002	On-going	$0	$0	$0
1.1.3.3	Monitoring and Reporting	10/1998	On-going	$2K	$2K	$0
	Total Quality Assurance			**$2K**	**$2K**	**$30.2K**

Breakdowns by site and funding source for QA cost estimates appear in the Section 5.1.

4.4.4 Technical Support Activities and Schedules (WBS 1.1.4)

Successful program execution requires the planning and integration of a variety of specialty disciplines and related technical activities. A more detailed description of the following activities is provided in the SEMP.

Table 4-9. Technical Support Activities and Schedules

WBS	Task	Start Date	End Date	Anticipated Funding		Planned Work Scope
				FY 1999	FY 2000	FY 2001
1.1.4.1	Environmental, Safety and Health	10/1998	On-going	$3.9K	$3.9K	$34K
1.1.4.2	Reliability, Availability, Maintainability	10/1998	On-going	$2K	$2K	$92.6K
1.1.4.3	Human Factors	1/2001	On-going	$0	$0	$92.6K
1.1.4.4	Value Engineering	10/1998	On-going	$2K	$2K	$92.6K
1.1.4.5	Integrated Logistics Support	1/2001	On-going	$0	$0	$92.6K
1.1.4.6	Transportation	1/2001	On-going	$0	$0	$34K
1.1.4.7	Safeguards and Security	1/2001	On-going	$0	$0	$34K
1.1.4.8	Research and Development	1/2001	On-going	$0	$0	$26.5K
	Total Technical Support			**$7.8K**	**$7.8K**	**$498.7K**

Breakdowns by site and funding source for Technical Support cost estimates appear in the Section 5.1.

4.4.4.1 Environment, Safety and Health (WBS 1.1.4.1). ES&H specialists will support the systems development and planning activities to ensure that all relevant ES&H considerations are addressed. This will include updating Safety Analysis Reports and other safety documentation as needed. ES&H signoff will be required for all safety-related systems and environmental actions and commitments.

4.4.4.2 Reliability, Availability, Maintainability (WBS 1.1.4.2). Reliability, availability, and maintainability (RAM) engineers/specialists will establish RAM objectives for systems and subsystems, participate in design activities, and examine design alternatives for RAM issues.

4.4.4.3 Human Factors (WBS 1.1.4.3). Human factors specialists will actively participate in design activities, report on these issues to management, and provide signoff for specific designs.

4.4.4.4 Value Engineering (WBS 1.1.4.4). Value engineering activities will be conducted by certified value specialists throughout this Program, as required by DOE O 430.1 and its related guide.

4.4.4.5 Integrated Logistics Support (WBS 1.1.4.5). Logistics planning will be incorporated into program planning throughout the program life to ensure effective operations, as required by DOE O 430.1.

4.4.4.6 Transportation (WBS 1.1.4.6). A Transportation Plan will be developed to define roles and responsibilities of the various organizations, schedules, contracting arrangements, and reporting requirements necessary to comply with the transportation requirements in the SRD.

4.4.4.7 Safeguards and Security (WBS 1.1.4.7). For near-term ^{233}U storage operations, safeguards and security will continue to be implemented in accordance with each site's safeguards and security program. For long-term storage, a Safeguards and Security Plan will be prepared as necessary to establish a safeguards and security program, in accordance with the SRD.

4.4.4.8 Research and Development (WBS 1.1.4.8). R&D needs will be incorporated as needs are identified during the Program life cycle. The following R&D activities have been identified to date to address issues specific to ^{233}U:

- Dry Blending Feasibility Studies and Experiment. This task will evaluate the feasibility of utilizing a dry blending process to isotopically dilute the enriched ^{233}U oxide (UO_3) with ^{238}U oxide. The intent would be to develop a non-aqueous process that would irreversibly lower the enrichment to <12% and thereby eliminate expensive safeguards and security features (e.g., high security vaults, armed guards, gates, etc.).

The Technical Team will continue to identify and pursue R&D needs as part of its on-going charter and include them as part of future PEP updates.

4.5 Closing Recommendation 97-1

In evaluating closure of its recommendations, the Board usually considers the effectiveness of DOE actions to ensure the fundamental issues continue to be adequately addressed. This PEP constitutes the management plan that will be used by DOE starting in 1999. It documents DOE's Program objectives to complete work begun under the IP and continue the life-cycle management of the ^{233}U inventory. The PEP will help ensure that DOE 's actions have been adequately institutionalized such that recurrence of the ^{233}U safety concerns identified in Recommendation 97-1 is unlikely. DOE considered the following factors in demonstrating institutionalization:

- DOE line management ownership of the safety issue and resolution with clearly defined roles and responsibilities (Section 3.1)

- Engagement and attention of senior DOE Managers on the issue (Sections 3.1.1 through 3.1.3)

- Integration of issue resolution into future work planning through the use of a chartered Technical Team (Section 3.1.7)

- Documented process for budget planning to address future funding based upon the defined work scope (Section 4.4.2.1)

- Overall completion of the IP commitments.

Based on a demonstrated institutionalization and performance under the IP, DOE will propose closure of Recommendation 97-1 to the Board after completion of all IP deliverables and a management review of Program effectiveness. It is anticipated that the Board will continue oversight of the Program and review of PEP activities.

5 COST DATA

Cost data presented herein were developed using inputs from the Technical Team and program support organizations. Each project within the Program will develop and maintain cost baselines. Cost accounts, and their associated implementation schedules, are the management control points for defining and implementing the program management baseline.

During early phases of the Program, cost estimates are of planning quality and not as refined as later estimates. Estimates developed during the planning phase become the cost baseline used to manage and control the Program during the life cycle. It is anticipated that as the Program matures, costs will be revised throughout the various design phases to contain significantly more detail, including significant site-specific costs. Each subsequent cost estimate will be compared with previous estimates, and explanations of changes will be documented and tracked until Program completion.

The costs summarized here were developed around the WBS and are not escalated. Activities are identified by funding organization (Table 5-1) and by the site or organization responsible for performing the activity (Table 5-3). As shown, funding organizations include DP, EM, ER (SC), MD, and NE; performing organizations include INEEL, ORNL, LANL, and LLNL, with various consolidation activities occurring at small holdings sites throughout the DOE complex. Total costs by funding and performing organization through FY 2001 are shown in Table 5-2 and 5-4, respectively. Table 5-5 lists estimated Program costs by the respective WBS element. These funding requirements reflect the incremental increases that are required above the current operating levels which represent the "no action" baseline. This ^{233}U Program is dependent on this underlying funding and the cost projections contained herein would be jeopardized by a change in this status.

Table 5-1. ^{233}U Safe Storage Program Cost Estimates by Funding Organization

WBS	Funding Organization	Task Name	FY 1999	FY 2000	FY 2001
1.1.1	DP	Systems Engineering	$81,000	$108,000	$108,000
1.1.2	DP	Program Management	$594,000	$287,000	$287,000
1.1.3	DP	Quality Assurance	$0	$0	$0
1.1.4	DP	Technical Support	$0	$0	$0
1.2.1	DP	INEEL Tasks	$0	$0	$0
1.2.2	DP	ORNL Tasks	$12,760,000	$12,374,000	$14,451,000
1.2.3	DP	LANL Tasks	$60,000	$350,000	$0
1.2.4	DP	Small Holdings Sites Tasks	$75,000	$65,000	$20,000
1.2.5	DP	Fissile Material Disposition Tasks	$0	$0	$0
		Total DP	**$13,570,000**	**$13,184,000**	**$14,866,000**
1.1.1	EM	Systems Engineering	$170,416	$1,004,743	$1,212,800
1.1.2	EM	Program Management	$563,280	$505,381	$856,790
1.1.3	EM	Quality Assurance	$1,963	$1,963	$30,200
1.1.4	EM	Technical Support	$7,852	$7,852	$498,750
1.2.1	EM	INEEL Tasks	$256,832	$180,309	$516,918

1.2.2	EM	ORNL Tasks	$0	$0	$0
1.2.3	EM	LANL Tasks	$0	$0	$0
1.2.4	EM	Small Holdings Sites Tasks	$0	$40,000	$17,000
1.2.5	EM	Fissile Material Disposition Tasks	$0	$0	$0
		Total EM	**$1,000,343**	**$1,740,248**	**$3,132,458**
1.2.5	MD	Fissile Material Disposition Tasks	$780,000	$3,000,000	$7,200,000
		Total MD	**$780,000**	**$3,000,000**	**$7,200,000**
1.2.4	ER (SC)	Small Holdings Sites Tasks	$0	$45,000	20,000
		Total ER (SC)	**$0**	**$45,000**	**$20,000**
1.2.4	NE	Small Holdings Sites Tasks	$0	$85,000	$36,000
		Total NE	**$0**	**$85,000**	**$36,000**

Table 5-2. Total Program Cost Estimates by Funding Organization

Funding Organization	FY 1999	FY 2000	FY 2001
DP	$13,570,000	$13,184,000	$14,866,000
EM	$1,000,343	$1,740,248	$3,132,458
MD	$780,000	$3,000,000	$7,200,000
ER (SC)	$0	$45,000	$20,000
NE	$0	$85,000	$36,000
Program Total	**$15,350,343**	**$18,054,248**	**$25,254,458**

Table 5-3. ^{233}U Safe Storage Program Cost Estimates by Performing Organization

WBS	Performing Site	Task Name	FY 1999	FY 2000	FY 2001
1.1.1.1	INEEL	System Planning	$62,190	$17,100	$17,100
1.1.1.2	INEEL	Requirements Analysis	$24,650	$202,075	$203,850
1.1.1.3	INEEL	Functional Analysis	$0	$0	$0
1.1.1.4	INEEL	Synthesis	$49,601	$118,720	$0
1.1.1.5	INEEL	Validation and Verification	$0	$0	$0
1.1.1.6	INEEL	System Analysis	$30,200	$615,773	$801,875
1.1.1.7	INEEL	Technical Design Reviews	$0	$0	$0
1.1.1.8	INEEL	System Integration	$3,775	$51,075	$189,975
1.1.2.1	INEEL	Funds Management / Monitoring	$15,100	$15,100	$15,100
1.1.2.2	INEEL	Program Planning	$231,625	$71,725	$168,100
1.1.2.3	INEEL	Program Baseline	$77,500	$62,400	$62,400
1.1.2.4	INEEL	Performance Measures	$7,550	$9,060	$22,650
1.1.2.5	INEEL	Program Reporting/Coordination	$181,940	$181,940	$247,810
1.1.2.6	INEEL	Configuration Management	$38,240	$97,130	$170,630
1.1.2.7	INEEL	Contracts Management	$0	$0	$0

1.1.2.8	INEEL	Risk Management	$0	$45,300	$79,500
1.1.2.9	INEEL	Regulatory Compliance	$0	$0	$0
1.1.2.10	INEEL	Skills Maintenance	$11,325	$22,726	$90,600
1.1.3.1	INEEL	Quality Assurance Management	$0	$0	$30,200
1.1.3.2	INEEL	Audits and Compliance	$0	$0	$0
1.1.3.3	INEEL	Monitoring and Reporting	$1,963	$1,963	$0
1.1.4.1	INEEL	Environment, Safety, and Health	$3,926	$3,926	$33,975
1.1.4.2	INEEL	Reliability, Availability, and Maintainability	$1,963	$1,963	$92,600
1.1.4.3	INEEL	Human Factors	$0	$0	$92,600
1.1.4.4	INEEL	Value Engineering	$1,963	$1,963	$92,600
1.1.4.5	INEEL	Integrated Logistic Support	$0	$0	$92,600
1.1.4.6	INEEL	Transportation	$0	$0	$33,975
1.1.4.7	INEEL	Safeguards and Security	$0	$0	$33,975
1.1.4.8	INEEL	Research and Development	$0	$0	$26,425
1.2.1.1	INEEL	INEEL Site Assessment	$172,725	$67,950	$45,300
1.2.1.2	INEEL	Manage Existing INEEL Inventory	$65,232	$50,283	$50,283
1.2.1.3	INEEL	Retrieve / Inspect / Consolidate / Repackage	$0	$47,656	$408,878
1.2.1.4	INEEL	INEEL Support to Waste Threshold Criteria in DOE Order	$9,438	$4,983	$3,020
1.2.1.5	INEEL	INEEL Support to Safe Storage Standard	$9,438	$9,438	$9,438
1.2.5.3	INEEL	INEEL Support	$120,000	$500,000	$500,000
		Total INEEL	**$1,120,343**	**$2,200,248**	**$3,615,458**
1.2.3.1	LANL	LANL Site Assessment	$15,000	$0	$0
1.2.3.2	LANL	Manage Existing LANL Inventory	$20,000	$20,000	$0
1.2.3.3	LANL	Relocate Inventory	$25,000	$330,000	$0
		Total LANL	**$60,000**	**$350,000**	**$0**
1.2.4.1	LLNL	Small Holdings Sites Assessments	$10,000	$0	$0
1.2.4.2	LLNL	Manage Existing Small Holdings Sites Inventory	$10,000	$10,000	$31,000
1.2.4.3	LLNL	Relocate Inventory	$55,000	$225,000	$62,000
		Total LLNL	**$75,000**	**$235,000**	**$93,000**
1.2.5.1	MD	MD NEPA Support	$0	$100,000	$4,500,000
		Total MD	**$0**	**$100,000**	**$4,500,000**
1.1.1.6	ORNL	System Analysis	$81,000	$108,000	$108,000
1.1.2.2	ORNL	Program / Strategic Planning	$125,000	$25,000	$25,000

1.1.2.5	ORNL	Program Reporting/Coordination	$226,000	$127,000	$127,000
1.1.2.10	ORNL	Skills Maintenance	$243,000	$135,000	$135,000
1.2.2.1	ORNL	ORNL Site Assessment and Other Actions	$180,000	$0	$0
1.2.2.2	ORNL	Manage Existing ORNL Inventory	$5,091,000	$5,145,000	$5,299,000
1.2.2.3	ORNL	Inspect / Repackage	$5,701,000	$4,485,000	$6,215,000
1.2.2.4	ORNL	P-24 Stabilization	$54,000	$768,000	$750,000
1.2.2.5	ORNL	Consolidate Small Site Holdings	$81,000	$0	$0
1.2.2.6	ORNL	Facility Upgrades	$1,247,000	$1,825,000	$2,155,000
1.2.2.7	ORNL	U-233 Safe Storage Standard Technical Projects	$397,000	$146,000	$27,000
1.2.2.8	ORNL	Waste Threshold Criteria in DOE Order	$9,000	$5,000	$5,000
1.2.5.2	ORNL	ORNL Support	$500,000	$1,500,000	$1,500,000
		Total ORNL	**$13,935,000**	**$14,269,000**	**$16,346,000**
1.2.5.4	SRS	SRS Support	$160,000	$900,000	$700,000
		Total SRS	**$160,000**	**$900,000**	**$700,000**

Table 5-4. Total Program Cost Estimate by Performing Organization

Performing Organization	FY 1999	FY 2000	FY 2001
Total INEEL	$1,120,343	$2,200,248	$3,615,458
Total LANL	$60,000	$350,000	$0
Total LLNL	$75,000	$235,000	$93,000
Total MD	$0	$100,000	$4,500,000
Total ORNL	$13,935,000	$14,269,000	$16,346,000
SRS Support	$160,000	$900,000	$700,000
Total Program	**$15,350,343**	**$18,054,248**	**$25,254,458**

Table 5-5. ^{233}U Safe Storage Program Cost Estimates by WBS Level 4

WBS	Task Name	FY 1999	FY 2000	FY 2001
1.1.1	Systems Engineering			
1.1.1.1	System Planning	$62,190	$17,100	$17,100
1.1.1.2	Requirements Analysis	$24,650	$202,075	$203,850
1.1.1.3	Functional Analysis	$0	$0	$0
1.1.1.4	Synthesis	$49,601	$118,720	$0
1.1.1.5	Validation and Verification	$0	$0	$0
1.1.1.6	System Analysis	$111,200	$723,773	$909,875
1.1.1.7	Technical Design Reviews	$0	$0	$0
1.1.1.8	System Integration	$3,775	$51,075	$189,975
	Systems Engineering Total	**$251,416**	**$1,112,743**	**$1,320,800**
1.1.2	Program Management			

1.1.2.1	Funds Management / Monitoring	$15,100	$15,100	$15,100
1.1.2.2	Program Planning	$356,625	$96,725	$193,100
1.1.2.3	Program Baseline	$77,500	$62,400	$62,400
1.1.2.4	Performance Measures	$7,550	$9,060	$22,650
1.1.2.5	Program Reporting/Coordination	$407,940	$308,940	$374,810
1.1.2.6	Configuration Management	$38,240	$97,130	$170,630
1.1.2.7	Contracts Management	$0	$0	$0
1.1.2.8	Risk Management	$0	$45,300	$79,500
1.1.2.9	Regulatory Compliance	$0	$0	$0
1.1.2.10	Skills Maintenance	$254,325	$157,726	$225,600
	Program Management Total	**$1,157,280**	**$792,381**	**$1,143,790**
1.1.3	Quality Assurance			
1.1.3.1	Quality Assurance Management	$0	$0	$30,200
1.1.3.2	Audits and Compliance	$0	$0	$0
1.1.3.3	Monitoring and Reporting	$1,963	$1,963	$0
	Quality Assurance Total	**$1,963**	**$1,963**	**$30,200**
1.1.4	Technical Support			
1.1.4.1	Environment, Safety, and Health	$3,926	$3,926	$33,975
1.1.4.2	Reliability, Availability, and Maintainability	$1,963	$1,963	$92,600
1.1.4.3	Human Factors	$0	$0	$92,600
1.1.4.4	Value Engineering	$1,963	$1,963	$92,600
1.1.4.5	Integrated Logistic Support	$0	$0	$92,600
1.1.4.6	Transportation	$0	$0	$33,975
1.1.4.7	Safeguards and Security	$0	$0	$33,975
1.1.4.8	Research and Development	$0	$0	$26,425
	Technical Support Total	**$7,852**	**$7,852**	**$498,750**
1.2.1	INEEL Tasks			
1.2.1.1	INEEL Site Assessment and IP Response	$172,725	$67,950	$45,300
1.2.1.2	Manage Existing INEEL Inventory	$65,232	$50,283	$50,283
1.2.1.3	Retrieve / Inspect / Consolidate / Repackage	$0	$47,656	$408,878
1.2.1.4	INEEL Support to Waste Threshold Criteria in DOE Order	$9,438	$4,983	$3,020
1.2.1.5	INEEL Support to Safe Storage Standard	$9,438	$9,438	$9,438
	INEEL Total	**$256,832**	**$180,309**	**$516,918**
1.2.2	ORNL Tasks			
1.2.2.1	ORNL Site Assessment and Other Actions	$180,000	$0	$0
1.2.2.2	Manage Existing ORNL Inventory	$5,091,000	$5,145,000	$5,299,000
1.2.2.3	Inspect / Repackage	$5,701,000	$4,485,000	$6,215,000
1.2.2.4	P-24 Stabilization	$54,000	$768,000	$750,000
1.2.2.5	Consolidate Small Site Holdings	$81,000	$0	$0
1.2.2.6	Facility Upgrades	1,247,000	1,825,000	2,155,000

1.2.2.7	U-233 Safe Storage Standard Technical Projects	$397,000	$146,000	$27,000
1.2.2.8	ORNL Support to Waste Threshold Criteria in DOE Order	$9,000	$5,000	$5,000
	ORNL Total	**$12,760,000**	**$12,374,000**	**$14,451,000**
1.2.3	LANL Tasks			
1.2.3.1	LANL Site Assessment	$15,000	$0	$0
1.2.3.2	Manage Existing LANL Inventory	$20,000	$20,000	$0
1.2.3.3	Relocate Inventory	$25,000	$330,000	$0
	LANL Total	**$60,000**	**$350,000**	**$0**
1.2.4	Small Holdings Sites Tasks			
1.2.4.1	Small Holdings Sites Assessments	$10,000	$0	$0
1.2.4.2	Manage Existing Small Holdings Sites Inventory	$10,000	$10,000	$31,000
1.2.4.3	Relocate Inventory	$55,000	$225,000	$62,000
	Total Small Holdings Sites	**$75,000**	**$235,000**	**$93,000**
1.2.5	Fissile Material Disposition Tasks			
1.2.5.1	MD NEPA Support	$0	$100,000	$4,500,000
1.2.5.2	ORNL Support	$500,000	$1,500,000	$1,500,000
1.2.5.3	INEEL Support	$120,000	$500,000	$500,000
1.2.5.4	SRS Support	$160,000	$900,000	$700,000
	Total Fissile Material Disposition	**$780,000**	**$3,000,000**	**$7,200,000**
Total Program		**$15,350,343**	**$18,054,248**	**$25,254,458**

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